The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Chicago, November 1, 1924 FOUNDED 1902 Volume XXVII, No. 22

Industrial Dictionary

PIT—A natural or artificial hole or cavity in the ground, especially when relatively wide and deep.

QUARRY—An excavation from which stone is taken for building or other purposes. Distinguished from mine by being widely open at top.

PLYMOUTH—An industrial locomotive manufactured at Plymouth, Ohio, and distinguished for its sturdy construction, long life, and matchless service. Especially adapted to pit and quarry industries.

HAULAGE — An industrial problem especially acute under present conditions, but easily solved by the installation of a Plymouth Gasoline Locomotive.

SATISIFACTION—A feeling of relaxation and content, particularly enjoyed by Pit and Quarry owners who have shifted the haulage burden to the Plymouth Gasoline Locomotive.

RESEARCH — Digging after facts, particularly exemplified by those who write for Illustrated Bulletins on haulage issued by

THE FATE-ROOT-HEATH COMPANY
Plymouth Locomotive Works
PLYMOUTH, OHIO

PLYMOUTH
Gasoline Locomotives

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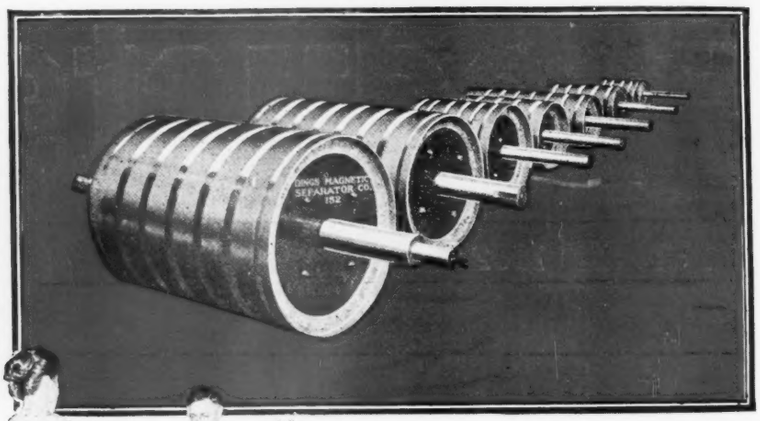

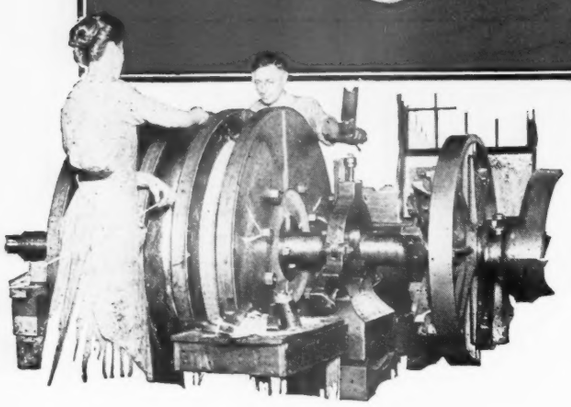

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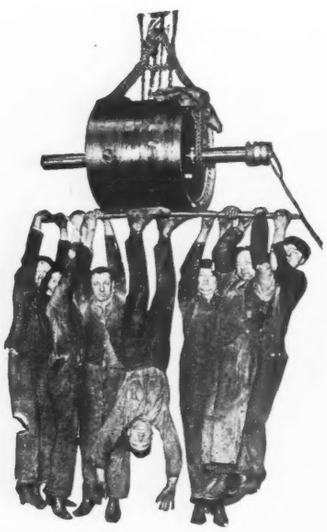

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Rock Products

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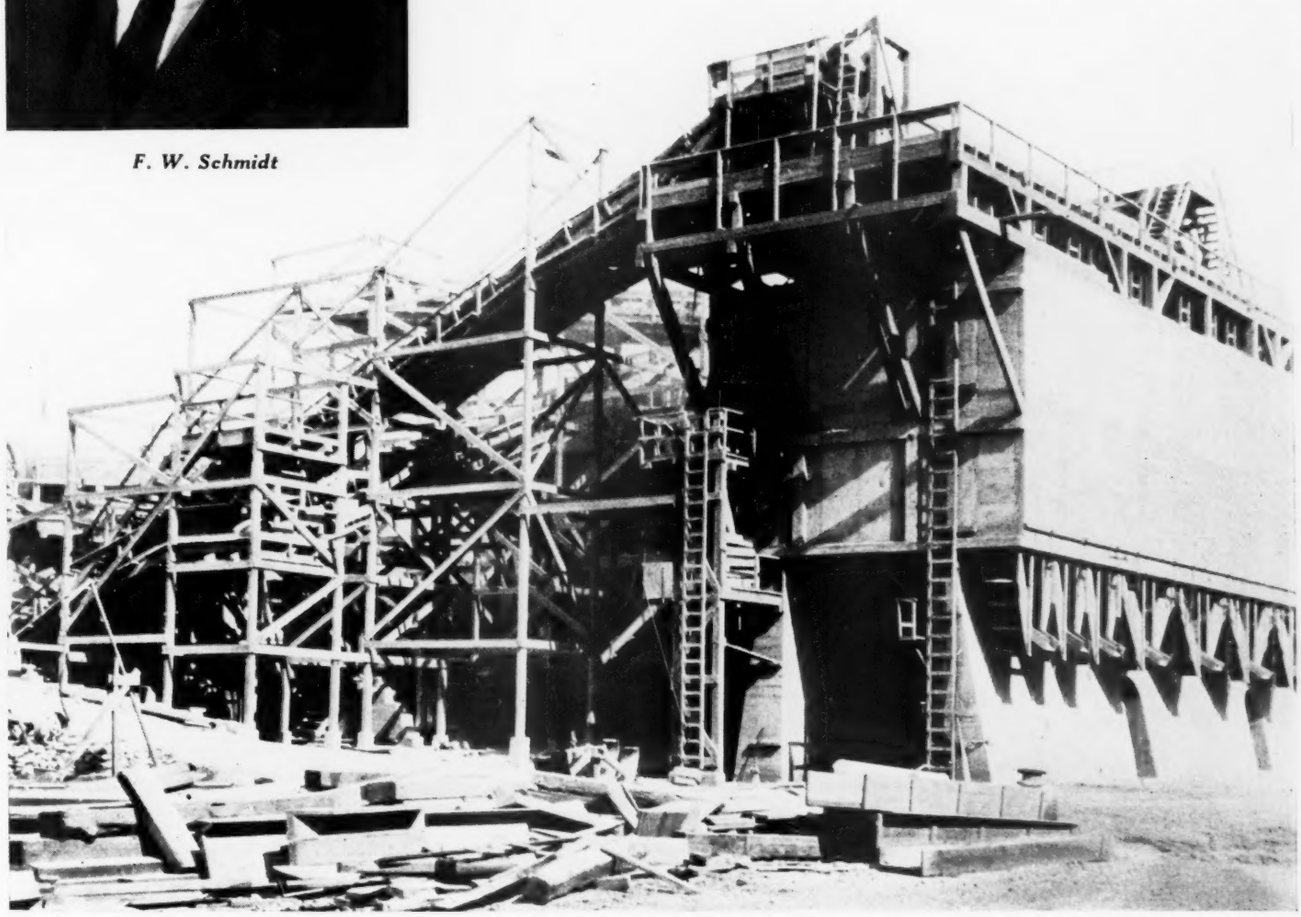
F. W. Schmidt

The New Crushing Plant at Bound Brook

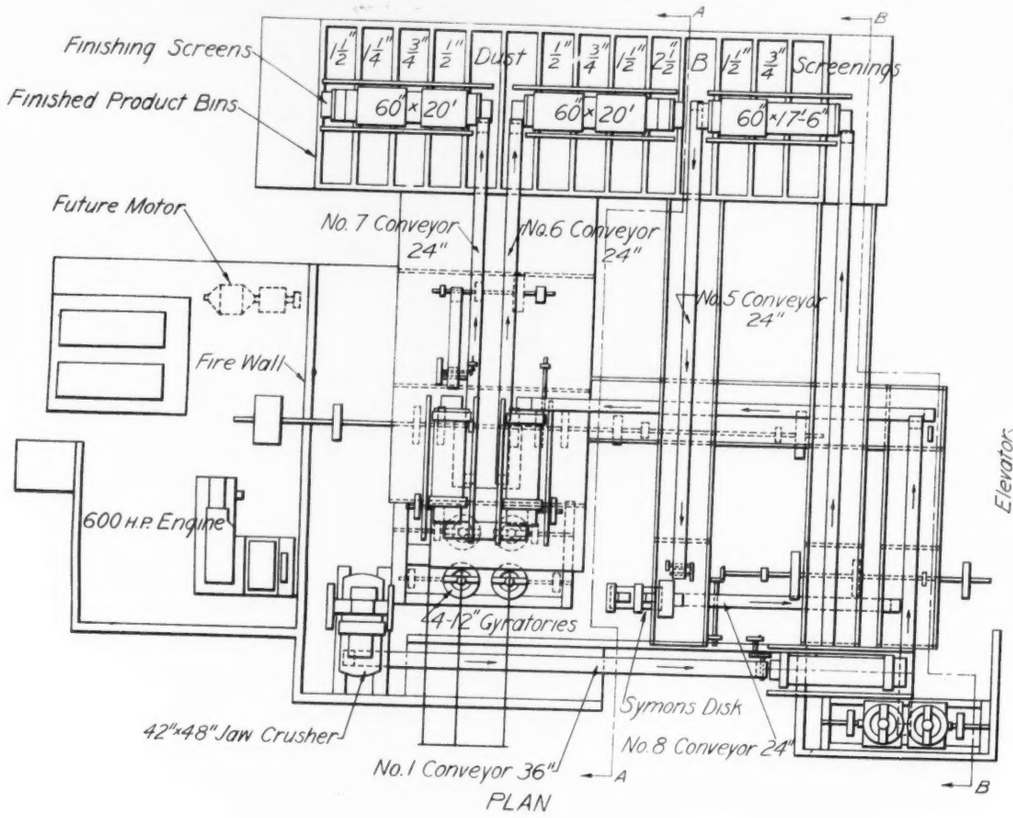
Design Which Embodies the Long Experience of F. W. Schmidt and His Associates in Crushing Trap Rock

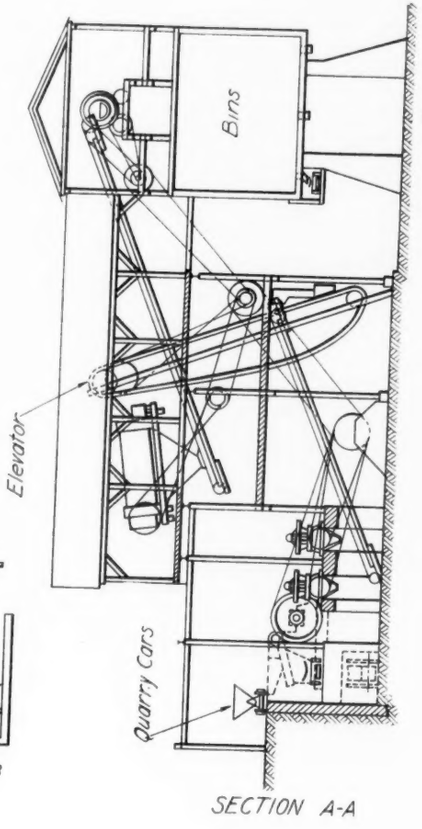
IT is not so often that a quarryman has the opportunity to use the experience of a lifetime in designing a plant to crush a certain kind of rock, and when he does the results are bound to be interesting. Such an opportunity came to F. W. Schmidt when one of his numerous plants burned and had to be replaced. The plant was located at Bound Brook, N. J., on the C. R. R. of N. J.

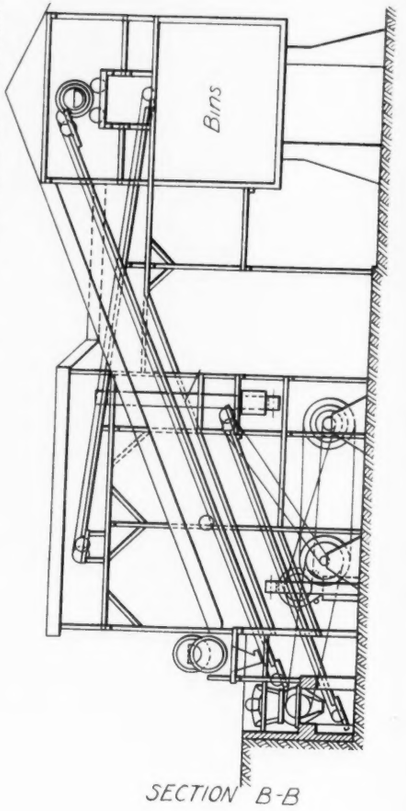
Bound Brook trap rock is one of the hardest traps to crush that a quarryman will encounter. It has a resistance to crushing of 42,000 lb. to the square inch and weighs around 185 lb. to the cubic foot in the solid. A well drill does well if it makes

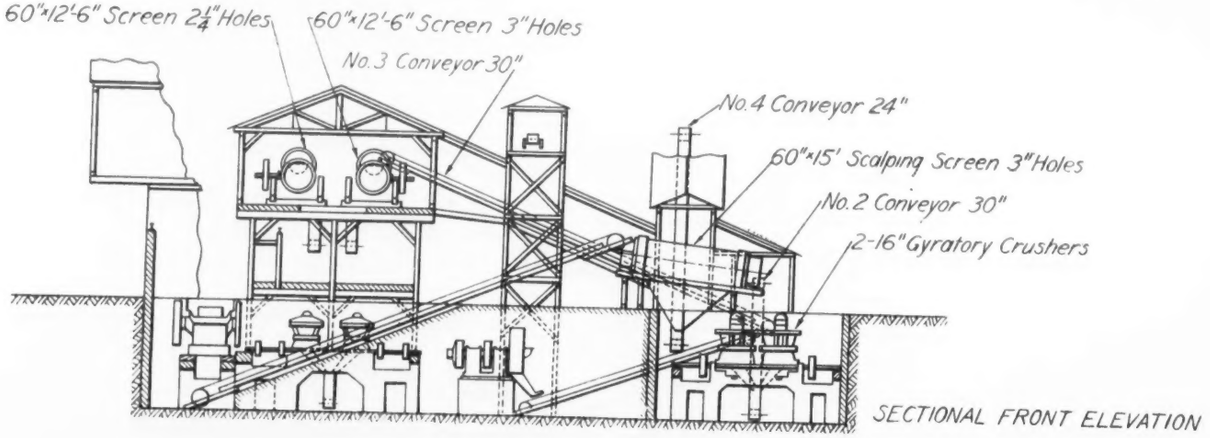


New crushing plant at Bound Brook, N. J. It will be housed in this winter

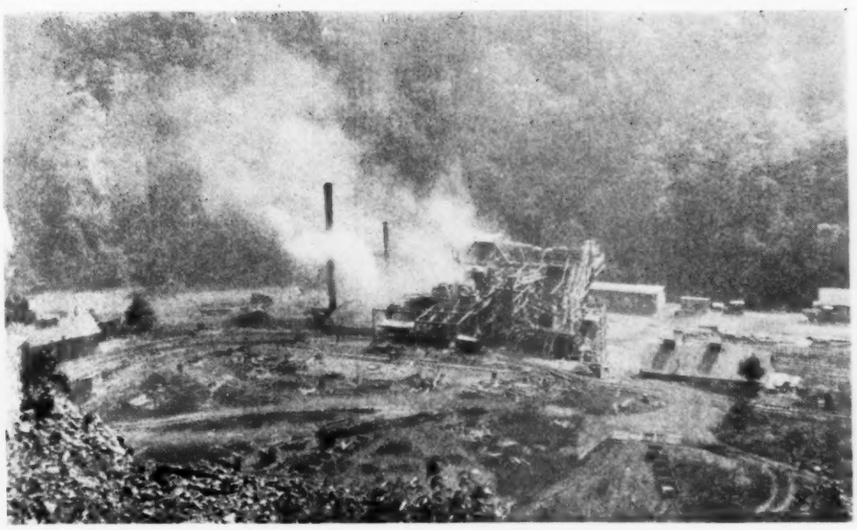




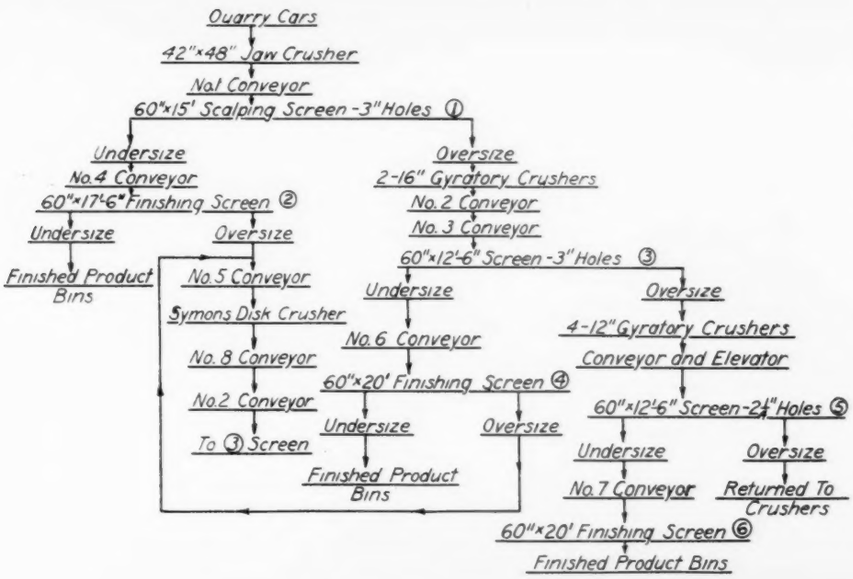




Plan and three sectional elevations of the new Bound Brook crushing plant



View of new plant from top of quarry face



Flow sheet of the Bound Brook crushing plant

anything between 5 and 6 ft. in a day's work. In addition it is tough, and there are few planes of weakness to help out in crushing. A plant that might run along merrily crushing ordinary limestone would stall in a minute if fed with a rock of this character.

Naturally such rock demands "special treatment." The reduction ratio for each crushing machine must be kept low and the various crushers proportioned so that each will do its share and no more than its share. This means that crushing must be "in series," each machine or set of machines making a partial reduction and passing on the rock to other machines to finish. A study of the flow sheet will show how these principles have been applied.

Since "crushing begins at the quarry," a word or two as to the quarry practice may properly introduce the plant description. The quarry face is 180 ft. high and well drill holes are put down 0 ft. below the quarry floor, 6½ in. in diameter all the way. The rock breaks well, as the ledge is full of fissures and not too many pieces require block holing. The broken rock is loaded by shovels into 2-yd. Koppel cars and drawn by Plymouth locomotives to the plant.

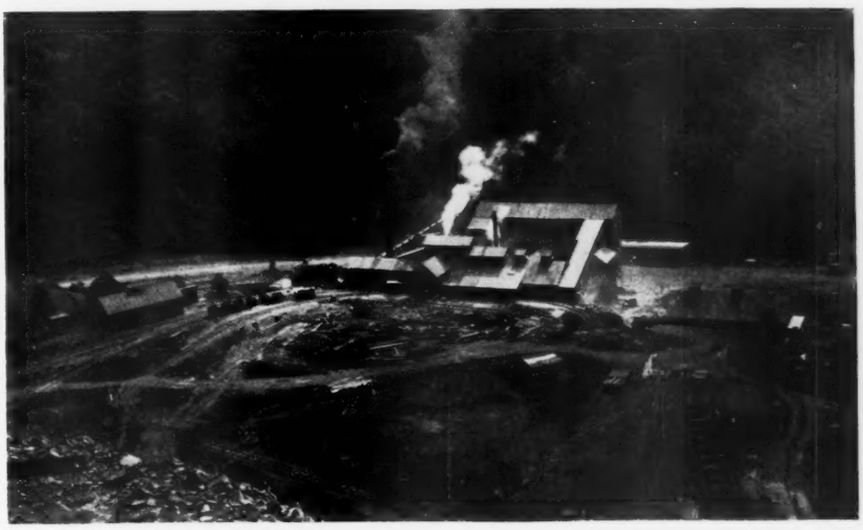
The cars dump directly to a 42x48-in. Traylor jaw crusher. Everything passes this and goes to a scalping screen of manganese steel, 60 in. diameter and 15 ft. long, with a 3-in. holes. The undersize goes by a conveyor (No. 1) to a 60-in. by 17 ft. 6 in. finishing screen which takes out 1½-in., ¾-in. and "screenings" and sends the oversize to a Symons disk crusher. The product of this crusher goes by two conveyors (No. 8 and No. 2) back to the same screen. Thus everything is held in closed circuit until it passes the finishing screen.

The oversize from the scalping screen goes to two 16-in. Traylor gyratory crushers. Their product is taken by a conveyor (No. 2) to a 60-in. by 12 ft. 6 in. screen with 3-in. holes, a sort of secondary scalper. The undersize of this screen goes by a conveyor (No. 6) to a 60-in. by 20-ft. finishing screen, the undersize going to the finished product bins.

The oversize of this screen goes to four 12-in. Traylor gyratory crushers and by a conveyor and an elevator to another 60-in. by 12-ft. 6-in. screen with 2¼-in. holes. The oversize of this screen goes back to the same crushers, hence nothing can get out of this circuit until it is finer than 2¼ in. The undersize of the screen goes to a second 60-in. by 20-ft. finishing screen, where it is made into finished product, the oversize of this screen being 1½-in. stone.

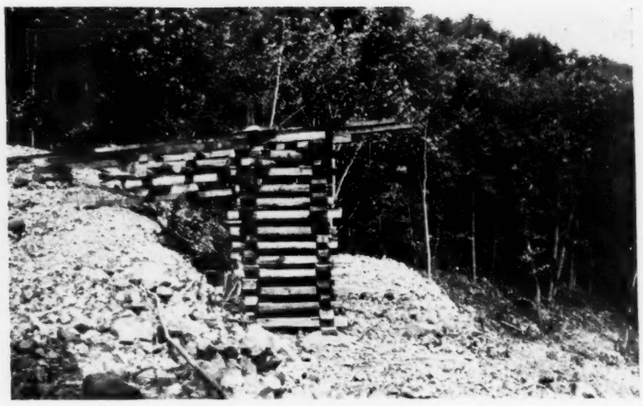
It is seen from this that after the stone goes to the scalping screen it gets into one of three closed circuits in which it must remain until it passes one of the finishing screens and falls into finished product bins.

It is also seen that the number and size of crushers has been proportioned to the work that is to be done. The largest unit



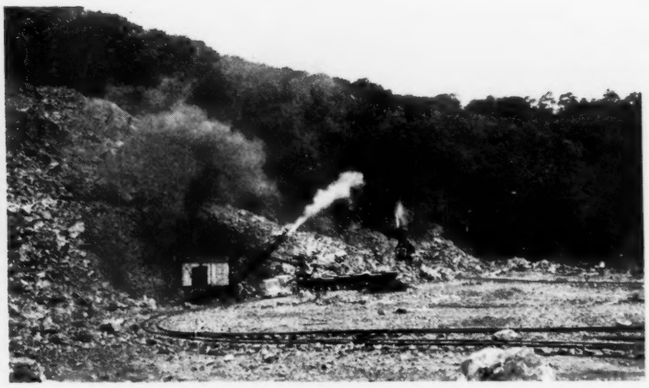
Former plant at Bound Brook, destroyed by fire in the fall of 1923

Well-drilling Bound Brook quarry

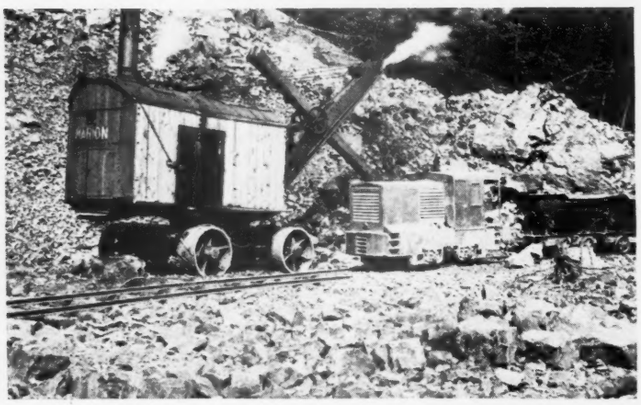


Example of well-drill set-up

One end of quarry from top of face

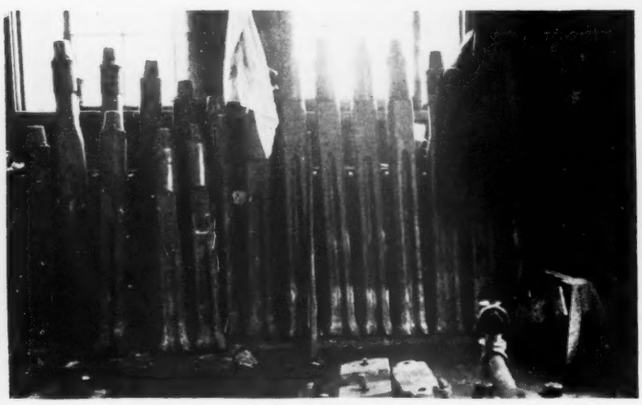


Shovel loading quarry train

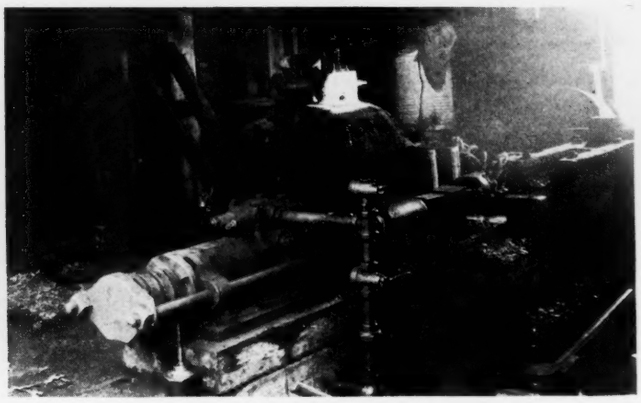


Tractor revolving shovel—gasoline locomotives

Special shovel dipper and all-steel dump cars



Battery of well-drill points ready for use



The drill sharpener that is used

is that made up of the four 12-in. gyratories and this is where the most work has to be done, the finishing to size requiring a greater proportional effort than the cracking of the rock to intermediate sizes.

All the screens are Traylor make and the heavy sections at least are of manganese steel to resist the abrasion from screening such a hard rock.

All concaves and mantles in the gyratories and jaws in the primary crusher are of manganese steel.

The construction of the plant is of steel, timber and concrete. The bins and supports are of concrete and so are the floors and the machine foundations. The main cross beams are steel I-beams and columns and lesser supports are of timber. This is good construction since it uses each material in the way in which it develops the greatest strength.

The bin supports are set so that the floor of the bin is cantilevered over the support on the outside, and this is a really scientific manner of supporting a bin. The load outside of the supports balances the load on the inside and this obviates the necessity of using heavy floor beams to support a great weight across a wide span. It is a construction that ought to be more widely used.

The bins are fitted with three sets of gates, one set in the center and two outside the supports. One of these sets feeds on a conveyor belt which passes under the bin and out to the end and is used for mixing sizes for different concrete stone specifications.

Power is from a steam plant. As the original steam plant was not entirely destroyed, it was rearranged and utilized.

At the time this plant was visited the roof had not been put on, although the plant was functioning well and turning out 2500 tons per day. It is intended to house in the plant and roof it over during the winter.

F. W. Schmidt, Jr.

Charles Higgins is local manager of the Bound Brook Crushed Stone Co. and William Haelig is superintendent. The main offices are those of the various crushed stone and sand and gravel companies of which F. W. Schmidt is president and general manager and I. W. Wortman secretary at Morristown, N. J. F. W. Schmidt, Jr., is assistant general manager in charge of operation.

Old Slate Quarry Near Montpelier, Vermont

THAT there is in Montpelier, Vt., a slate quarry that might be worked profitably was brought to public attention by George L. Blanchard at a meeting of the Montpelier Chamber of Commerce. The quarry has not been worked for about 40 years, but it contains slate that is said by experts to be of the best quality.

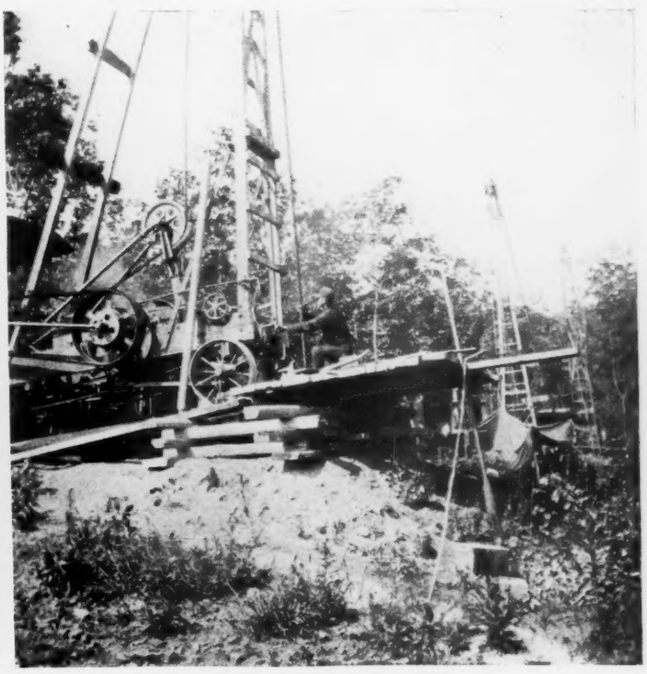
It is located in a spot that might easily be made accessible by railroad. In fact, a survey for a railroad track was made to the spot after the production of the stone in commercial quantities had been begun. Because of a combination of circumstances, some of which are now forgotten, the working of the quarry was abandoned soon after it was opened. However, some of the product was put on the market and the slate is on several of the houses in this city.

The quarry was opened back to a vein of black slate 300 feet in thickness and believed to be continuous. The location is such that the quarry might be operated economically, for pumps would not have to be installed, as the water can flow out by gravity. Loaded cars could also be run down a slope and would not have to be hoisted.—*Burlington (Vt.) News.*

Great Building Year

INDICATIONS are that 1924 will be the greatest building year in the history of the company, according to a review made public by the Indiana Limestone Quarrymen's Ass'n. Building construction for the first eight months of the year has reached a total of $3,429,000,000, and there still is a widespread demand for building.—*Warren (Penn.) Mirror.*

Scalping screen at Bound Brook



Well drills working in battery

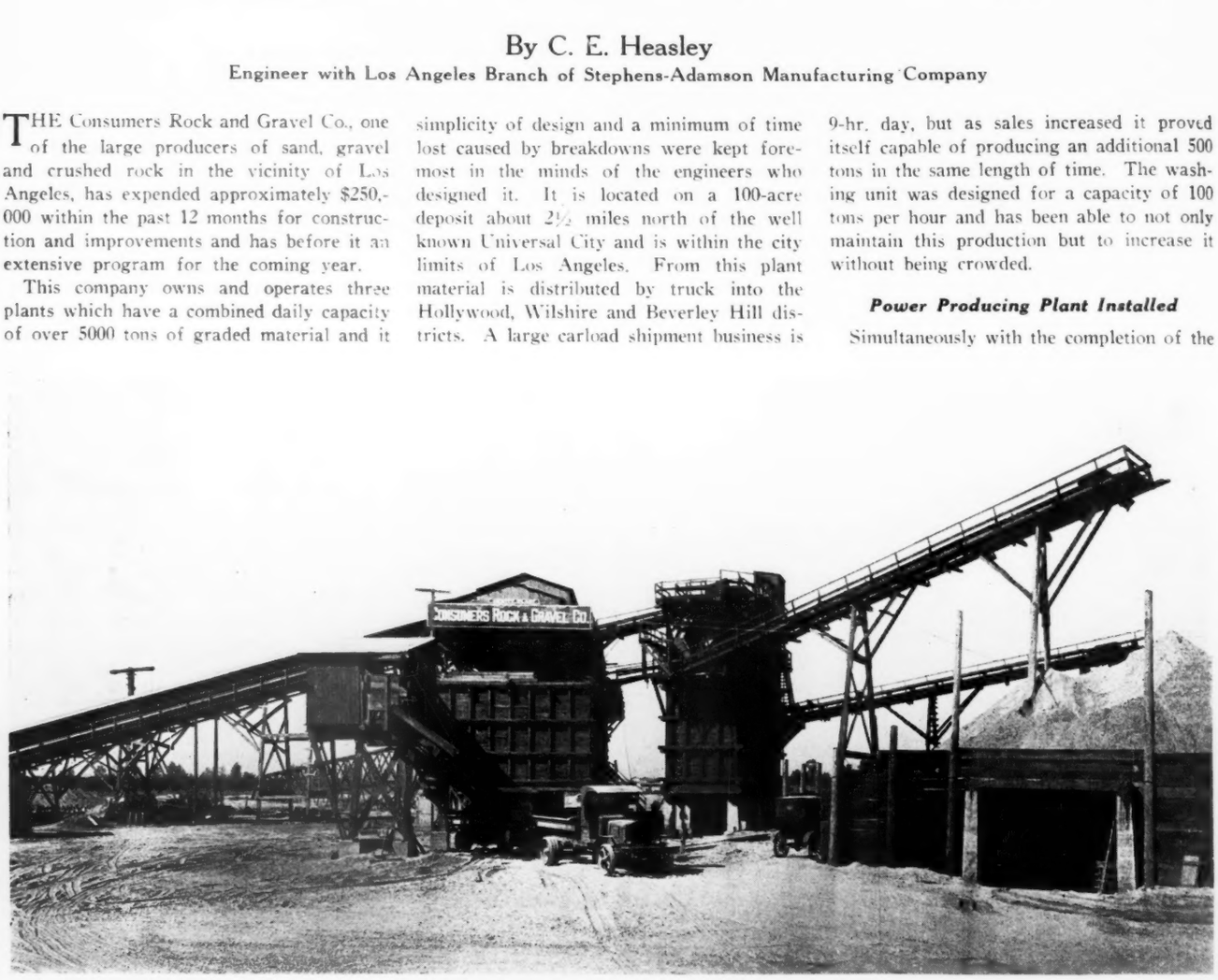
New Plant in the Los Angeles District

Consumers Rock and Gravel Company Erects Combined Dry Screening and Washing Plant with Doubled Sources of Power and Water Supply

By C. E. Heasley
Engineer with Los Angeles Branch of Stephens-Adamson Manufacturing Company

THE Consumers Rock and Gravel Co., one of the large producers of sand, gravel and crushed rock in the vicinity of Los Angeles, has expended approximately $250,000 within the past 12 months for construction and improvements and has before it an extensive program for the coming year.

This company owns and operates three plants which have a combined daily capacity of over 5000 tons of graded material and it also owns and operates a large fleet of trucks with which it delivers its products. The three plants are designated as the Alameda, Tejunga and Hewitt plants. Two of these, the Alameda and Tejunga, are operated as dry screening and crushing plants only. The third, the Hewitt plant, is operated as a combined dry screening, crushing and washing plant. It has a bunker storage of approximately 2500 tons and in connection a ground storage of 10,000 tons, which is to be described later in this article.



Hewitt plant showing end of concrete tunnel underneath 10,000-ton washed sand and gravel storage. In foreground of main bunkers is car-loading belt

The Hewitt Plant

The Hewitt plant, which was built in 1923, is an up-to-the-minute plant in every respect. Low initial cost, low production cost, simplicity of design and a minimum of time lost caused by breakdowns were kept foremost in the minds of the engineers who designed it. It is located on a 100-acre deposit about 2½ miles north of the well known Universal City and is within the city limits of Los Angeles. From this plant material is distributed by truck into the Hollywood, Wilshire and Beverley Hill districts. A large carload shipment business is being developed in addition to this. This was originally designed to operate as a dry screening and crushing plant, but soon after its completion the officials of the company, foreseeing the demands for washed material, added a washing unit early in 1924. The entire plant, including the dry and wet units, was designed by the engineers of the Stephens-Adamson Manufacturing Co.'s Los Angeles office and all equipment for the plant was built in the Los Angeles shops of the Stephens-Adamson Manufacturing Co. The erection of the plant and the installation of the equipment was carried on under the supervision of "S-A" engineers.

The plant was originally designed to produce 2000 tons of finished aggregate in a 9-hr. day, but as sales increased it proved itself capable of producing an additional 500 tons in the same length of time. The washing unit was designed for a capacity of 100 tons per hour and has been able to not only maintain this production but to increase it without being crowded.

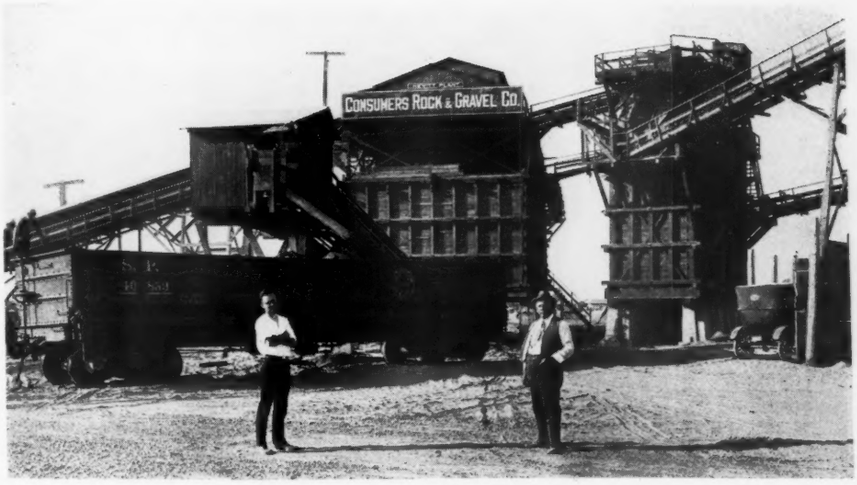
Power Producing Plant Installed

Simultaneously with the completion of the washing unit a complete power producing plant was installed. This was put in during the much advertised power shortage which occurred in southern California in the summer of 1924, and its purpose was to avoid possible tie-ups due to power shortage in the future. The power installation is capable of producing current to operate 150 hp. and in addition the plant is connected with the power lines of the municipal power works of the city of Los Angeles, and this insures plenty of power in the event of developing in the plant's own power system.

To insure a plentiful supply of water for washing, the company has just drilled a deep water well on its property close to the plant. This supply, in connection with the water

from the mains of the city of Los Angeles, guarantees a plentiful supply of water even though one of these sources should fail.

Through these doubled sources of supply of power and water the management is assured that the requirements of their customers for rock and gravel will always be met, and it also feels amply prepared for any program of expansion which it may be necessary to adopt in order that the production of the plant may keep abreast of the needs of the future.



Car-loading conveyor, with Fred Ginoux, president, at right, and Frank Gautier, general manager, at left, with car being loaded with dry-screened sand. The building at right is the washing plant

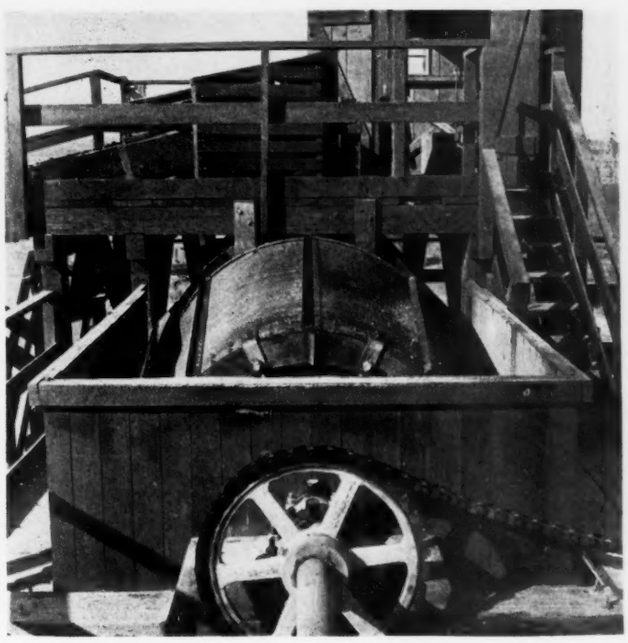
In the pit, the bank material is loaded into Western dump cars by means of a Bucyrus 50-B steam shovel. These cars are hauled up an incline by an electric hoist and dumped into a hopper. From this hopper it is carried on a 30-in. by 110-ft. belt conveyor to a 42-in. by 20-ft. scalper screen. There the fines up to 1½-in. are taken out and go by a 24-in. belt of 210-ft. centers to the top of the dry screening plant from which the load may be spouted to a 42-in. by 20-ft. trommel screen and the final separation made dry, or sent by an 18-in. belt conveyor, 60-ft. centers, across a 40-ft. span to the washing plant. If it is sent to the washing plant it is discharged into an 84-in. jacketed Gilbert washing screen, where the water for washing is added. The inside shell has 9/16-in. perforations. The oversize goes to a conical, spider type screen where the ¾-in. gravel is separated from the 1½-in. rock. The outside jacket of the Gilbert screen is of 4-mesh wire, which separates the pea gravel (between 9/16-in. and 4-mesh) from the sand. The pea gravel goes either to the bunker or to the ground storage and the sand and water go to two Stephens-Adamson sand washing machines from which it goes either to the bunkers or to storage.

The washed material which cannot be stored in the bunker is taken to the ground storage by means of two 18-in. belt conveyors of 80-ft. centers. One takes the washed sand from the washers automatically as the bunker fills up; the other takes the gravel from the bunker. With this arrangement the plant is able to keep a large supply of washed material on hand and can continue to run after the bunkers are filled.

The oversize rock from the scalper screen goes to an Allis-Chalmers gyratory crusher and then through a Symons disk crusher, which crushes it to the finished sizes. It is then carried by a 24-in. belt conveyor, 220-ft. centers, to a 42-in. by 20-ft. rock screen, trommel type, on top of the dry screening plant, where the crushed rock is screened into sizes and sent to the bunkers.

The Ground Storage

The ground storage for the washed material consists of a concrete tunnel 100 ft. long sloping from both ends to the center from which runs a tile drain to a cistern located outside. Hence there never is any water standing in the tunnel. Trucks drive in at one end, are loaded by means of gates in the roof of the tunnel and proceed on through to the scales. All material delivered from the three plants of this company is weighed, giving the customer the assurance that he is getting what he pays for.



Left—Hewitt washing plant showing 84-in. jacketed screen with drive; right—looking up conveyor gallery from underneath scalper screen. At the right is a 24-in. belt with 210-ft. centers for sand and up to 1½-in. gravel to sand screen and washing plant. Conveyor to left is a 24-in. belt with 220-ft. centers, and takes crushed rock from disk crusher to rock screen on top of bunkers

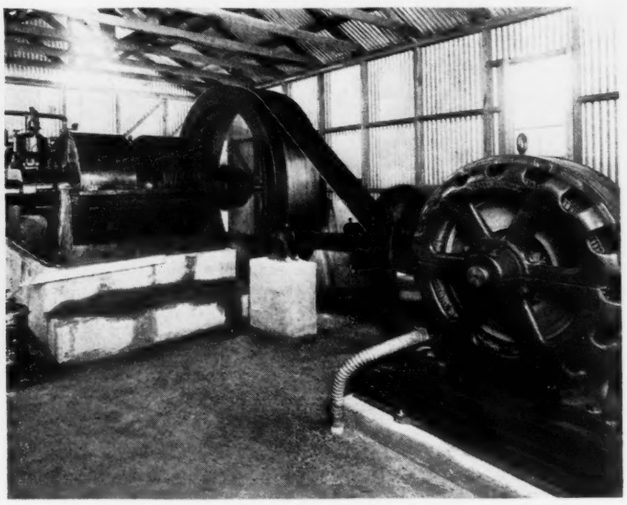
View taken from upper end of washed sand storage conveyor. Blacksmith shop, storeroom, power plant and part of pit at left

mately 6 ft. of overburden which covered the entire deposit, as well as a 5-ft. stratum of clay which lay about 20 ft. below the surface.

Difficulties of Working Deposit

Engineers of the Stephens-Adamson Manufacturing Co. were consulted regarding the advisability of opening a pit in the deposit and they gave as their opinion, that in view of the tremendous cost of removing the overburden and the clay stratum, unless the entire plant was designed to operate at an exceptionally low cost per ton of finished material, the deposit could not be worked as a paying proposition. Hence the necessity of close figuring in plant construction, bearing in mind at the same time that the plant must stand the strain which is placed upon such a structure and also to furnish equipment which would be durable and give long, uninterrupted service.

To remove this overburden and layer of clay a Pawling & Harnischfeger gasoline shovel, Western dump cars and a Plymouth



Left—Hewitt washing plant, showing twin sand washers 42 in. by 15 ft.; right—the company's insurance against possible power shortage

All Material Handled by Belt Conveyors

The plant is out of the ordinary, in that it contains no bucket elevators. All material is handled on belt conveyors and each unit of equipment is driven by an individual motor, through cut spur gears, which delivers tne full power of the motor to the machines This does away with delays and shut downs caused by inefficient and slipping belts.

The company has its own spur track which connects with the Southern Pacific main line for carload shipments. From the dry screening plant, railroad cars are loaded by means of a 24-in. belt conveyor under the center of the bunkers. From the washed material bunker the material is loaded directly from the bins into the cars, as this bunker is built parallel with and close enough to the track to load cars by means of chutes.

One of the big problems encountered in opening this pit was the removal of approxi-

Foreground, 30-in. belt conveyor, 90-ft. centers taking material from hopper to scalper screen ahead of crushers

locomotive are required in addition to the regular equipment used in excavating the bank material.

The Alameda Plant

The company's Alameda plant is located in the city of Vernon, a suburb of Los Angeles, which has been practically set aside for manufacturing purposes. It is about 2½ miles southeast of the business center of Los Angeles. From this plant and a distributing bunker, operated in connection with it, material is trucked to the trade in districts south, east and west of the business district as well as the business district itself.

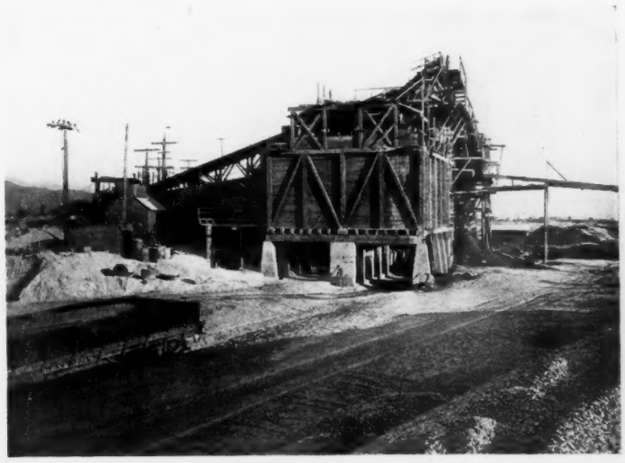
The Tejunga Plant

From the Tejunga plant, which is located in the San Fernando valley, near where the Lankershim boulevard joins the busy San Fernando road, material is trucked to jobs in Burbank, San Fernando, Glendale and other communities in this thriving valley, also into Los Angeles and more especially into the Hollywood district. A large proportion of the material produced by this plant is shipped in carloads to distributing bunkers in Vernon and Santa Barbara. Carload orders are also filled from this plant for material ordered from many other towns in southern California.

Plans Prepared for Complete Washing Plant

At present plans are being prepared for a complete washing plant to work in connection with the dry screening plant on Alameda street. So in the very near future customers, no matter in what district around Los Angeles, can depend on the Consumers Rock and Gravel Co. to furnish material of their own production which will meet with any specifications.

The main offices of the Consumers Rock and Gravel Co. are at 2600 South Alameda street, Los Angeles. Fred Ginoux is president of the company and Frank Gautier is general manager.



Left—Tejunga plant. The box at top right of bunkers is rock washer for dry-screening plant so that rock may be washed without adding a washing screen; right—dragline bucket operation; also 24-in. belt conveyor from underneath crushers discharging to 24-in. belt to screens

The Year 1924 Sees Many Bad Trade Practices Smashed

ACCORDING to Allen E. Beals in the current number of the Dow Service *Daily Building Reports*:

"The year 1924 has been particularly notable, not so much because of the building records it will have broken, as for the wasteful, costly and out-of-date precedents, usages and trade customs it has seen demolished. It has seen trade purging processes applied to certain branches of the building trades with a vigor and righteousness that has surpassed the most sanguine expectations of its proponents, and as the year passes into history it hears the call from other trades for similar purification and ennoblement.

"The foremost men of finance, design and execution foresee as something sure to come ere long, a central appeal board, consisting of high commissioners appointed by the various trades, their presiding officer, by their election, being the judge advocate-general and who shall be the final arbiter for the entire building trade of his jurisdiction, administering with due police power a code of practice upon which the owner, architect, general and sub-contractor alike may feel assured that when disputes arise substantial justice may be done.

"Tales told by men of standing and recognized repute of trade tricks and practices resorted to currently by irresponsible persons for various forms of gain would seem beyond belief were it not for the plaint of the proper city officials, that full and rigid inspection suffers in rush times like these, for lack of men. Costs rise, waste occurs and poor construction, with all the risk of life and health that such things imply, resulting when only one or two of all the building crafts engaged in erecting buildings have supervision and a moral code administered by fearless men who judge by no other gauge than whether an act is right or wrong and hands down his decision regardless of men or interests involved.

"If building lagged in any part of 1924 it lagged in protest against those arts and practices which, if not notorious, are none the less sinister and dangerous because they have escaped the public eye.

"The New York Chapter of the American Institute of Architects, the Electrical Board of Trade, the Common Brick Manufacturers of America, some of the great surety companies are typical of the forces at work to restore the building industry to its once high place of integrity and honor. The year 1924, in passing, sees an experiment more than justified, but the building year of 1925 portends more drastic application of the new honor code.

"In short, the building trades must clean its house next year or have the public do it for them. The way to do it has been tried and proved and the public even now expects the other trades to follow."

The Chemical Resistance of Engineering Materials

THE CHEMICAL RESISTANCE OF ENGINEERING MATERIALS — By Marston Lavell Hamlin, Assistant Professor of Chemistry in Trinity College, Durham, N. C., and Francis Mills Turner, Jr., Technical Editor, Chemical Engineering Catalog. Cloth, 267 pps., $5.00. The Chemical Catalog Co., 19 East 24th Street, New York.

THIS is a book which will not be of much use to the majority of Rock Products readers but when one of them needs it he will need it very badly. The facts about chemical resistance of building material are scattered through the whole literature of chemical engineering. Hence the value of a book in which they are collected. The ordinary engineer can turn to it whenever a problem concerning the resistance to certain chemical actions of the materials he would employ comes up.

The last quarter of the book is an appendix made of excellently arranged tables giving the composition and chemical properties of many substances and much other information useful to the chemist and chemical engineer.

Factors Affecting the Life of Lime-Kiln Brick Linings

Reasons for Failures of Linings—Choosing Brick and Laying Them Properly

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

SOME lime kilns have a life of over a year between repairs; other kilns have a life of only from one to two months. Of course, there must be reasons for this great variation. A knowledge of these reasons will help the development of methods that will tend to lengthen kiln life, reduce cost of kiln upkeep and reduce kiln overhead. It will also increase kiln capacity since the production of many kilns is held back because they do not stand the high temperatures.

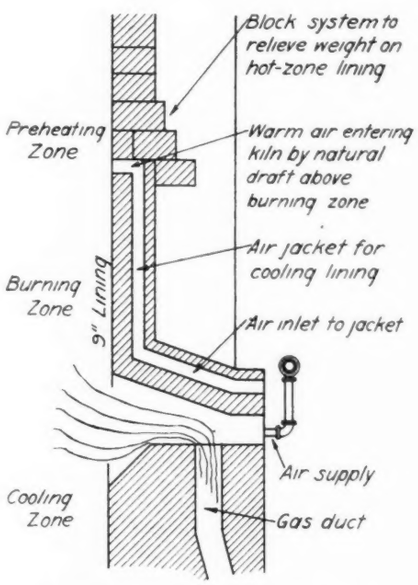
If one knew how to build a kiln that consistently would have long life, he would be able to regulate the time of repairs so that it would fall in a period when the lime demand is limited, and kilns could be repaired without interfering with production. If the life is erratic, long at times and short at others, the kilns may have to come off the line at the busiest portions of the season, which greatly affects production, or necessitates paying overhead on kilns that otherwise might not be necessary.

As a definite example of the extremes that exist, there is a kiln in a certain plant that was putting out regularly 19 tons of high calcium lime per day for a period of 13 months. In another plant also burning high-calcium stone, a kiln turning out 11 tons of lime per day had to be repaired three times in a 13 months' period. Each run lasted only 2½ months. In some plants kilns will not last even this long; whereas, under proper conditions, a kiln should have at least a 10 months' continuous-running period. Kiln running-periods of 15 months are on record; in some extraordinary cases they were on for years burning high-calcium stone.

There are several reasons for failure of kiln lining. They are:

Causes of Lining Failure

1. The brick used may be of poor quality, one that will melt at a temperature lower than the kiln temperature.
2. The brick may be of a kind that will readily combine with lime to form silica-alumina-lime slag which will have a much lower fusing temperature than the brick itself.
3. The clay in the brick may be good but may be improperly burned causing shrinkage in the walls.
4. The walls may have been poorly made. Joints may be too great, brick corners chipped, brick poorly lined up or improper clay used for bonding. Brick may also be of unequal dimensions, with which good solid walls are difficult to make.
5. The brick may have a high co-efficient of expansion which will make it tend to spall.
6. Structural details of kiln construction



Section of kiln wall showing air jacket and method of relieving lining of pressure

may be wrong, the span of the arches may be too great or an improper size of brick may have been used. The weight on the inner kiln walls may be too great.

7. Combustion of fuel may be wrong—such that an intense short flame is obtained instead of a mild long flame. The heat may be concentrated too much at localized points.
8. The drawing of the lime from the kiln may be wrong—completely burned lime may be left where the temperatures are high or the kiln may be cooled considerably during drawing (causing expansion and contraction strains).
9. The kiln may be so designed and so operated that the tendency of the flame is to sweep over the brick surfaces rather than to penetrate into the kiln center.

A brick which has a rated melting point of 3200 deg. F. may sometimes melt at a lower temperature. The two factors that will vary the melting point from what was determined in the laboratory are the pressure to which the brick is subjected and the length of time it is under heat.

Lime Reduces Melting Point of Best of Brick

A good brick when tested in the laboratory should stand a temperature of 3200 deg. F. Since temperatures in kilns are usually below 2900 deg. F. it would seem then that there should be no difficulty with such brick. Unfortunately this is not so; for it is found that the highest-grade brick will not last indefinitely even in kilns that are being operated at relatively moderate temperatures. This is due to the erosion of the brick and to its decomposition by entering into combination with the lime to form a slag which has a relatively low melting point.

It is commonly known that acid and basic substances have a decided tendency to enter into combination to form compounds having entirely different characteristics. Lime in the kiln is a strongly basic substance, while a clay brick is an acid material. Hence the two will combine to form slag.

Lime is an almost infusible substance. Very high temperatures (over 4500 deg. F.) are necessary to melt it. Kaolin, the main component of ordinary brick as used in lime kilns, will melt at around 3200 deg. F. When, however, kaolin and lime come together at high temperatures, due to the acid properties of the one and the basic properties of the other, they will combine to form a slag whose melting point is neither that of lime nor that of kaolin, but is lower than either. This slag may have a melting point as low as 2350 deg. F.

Now, if the temperature in the kiln is, say 2500 deg. F., the slag, due to its lower melting point, will be fluid or if not fluid at least soft. If it is fluid it will flow like molasses; if it is only soft, it will not actually flow but will be displaced as the lime slides down the shaft when the kiln is drawn. Most of the so-called erosion damage is due to the softened surface in the hot zone. It is erosion of slag and not of brick. That this is so is proven by the fact that in the preheating zone, where the rubbing of stone and brick is very great and greater than in the

hot zone, the bricks last for years. They seldom have to be replaced.

A brick-lime slag fusing temperature depends upon the amount of lime in the slag. Tests by Ricke show that at first, as the lime ratio in the slag is increased, the fusing temperature decreases; then beyond a certain point the reverse is true. The curves, however, are not regular. The conclusion is that some brick-lime slags melt easier than others. This principle is taken advantage of in cement kilns where the kiln is so operated that a slag is produced on the walls that is infusible at ordinary kiln operating temperatures. This remedy cannot, however, be applied in the case of a lime kiln, especially not a vertical lime kiln. It indicates, however, a possibility of treating the walls of a kiln with substances that will react with the brick and form a neutral slag, having a relatively high fusing temperature. When the kiln is put into operation, this neutral slag will not combine with the lime to form slags that will have lower fusing temperature than the operating temperatures.

Highly Refractory Brick Not Always Best

The fact that certain brick, a "good high refractory brick," has a high fusing temperature means little, if the brick is such that it combines chemically with lime to form a substance having low fusing temperature. A certain very high-grade brick having a fusing temperature of 3400 deg. F. formed a slag that had a fusing temperature of 2550 deg. F. Consequently the fusing temperature of the brick in lime-kiln service, the temperature that counted, was not 3400 but rather 2550 deg. F. It is said that a high-refractory brick and one that has a dense structure will hold its body better and will not be so likely to combine chemically to form slag as a more porous brick having lower softening temperatures.

If an ordinary silica-alumina fire brick is used it should have about the following qualities: The bricks should be of uniform size, flat (not warped in any way), and the surface should be relatively smooth, so that brick will lie against brick without need for having much mortar in the joints. The corners of the bricks should be sound, not chipped. The brick should be well burned so that all burning shrinkage is removed from it. The grain arrangement should be dense, obtained by thorough working of the clay. Hand-made brick, in this last respect, is assumed to be better than machine-made. The fusing temperature should be above 3200 deg. F. The fluxes such as titanium, iron oxide, lime, magnesium and alkalies should be present in the smallest percentages possible.

When constructing a wall brick should be laid against brick with as little mortar as possible. The brick should be dipped in a rather thin solution of the same kind of clay as that of which the brick is made; that is, of good clay, one that will stand the temperature.

The idea is, however, to have the brick touch brick without clay. The clay mortar is intended to fill only the interstices between brick created by the unevenness of the brick. If bricks were absolutely true and smooth no clay would be needed. This would be the ideal condition. The reason for desiring smooth and true shaped brick is to reduce the size of the clay joints.

The objection to clay joints is especially great in the arches. The clay mortar is not burned as the brick is. It has to be burned in the wall and since there is considerable shrinkage in the material while burning and this joint shrinkage is accumulative in reducing the lengths of the arches they have a tendency to sag, especially when the span is great. The strongest arch is one having a true circular shape, the smaller the radius the better. This is because the accumulative shrinkage will be less and the sag which opens the lower joints is less. An arch of 42-in. span is entirely too great in a lime-kiln. It is too weak and too liable to distortion. Therefore kilns having a single furnaces on each side had better be changed to twin furnaces with eye arches 24 in. wide. The accumulated shrinkage in a short-span arch will be much less and the sag less.

The same reasoning will apply to walls except that, in this case, the matter is not so serious if considered from only a sagging standpoint. There are, however, other objections to large clay joints, the main one being that the clay shrinks, leaving the joint open; or the clay may entirely work itself out of the joint, leaving a space in which lime dust can collect. This lime dust combines with the brick and forms slag having a low fusing temperature. With tight joints the decomposition of the brick takes place only on the surface; with open joints the brick fuses both on the surface and inside the wall, under which condition the lasting life naturally cannot be so great.

Pressure Has Effect on Life of Lining

The lasting quality of brick is not so great when the brick is subjected to high heat when under pressure as when pressures are low. It then is much more liable to deformation. Therefore the weight on the hot-zone kiln-lining should be as much relieved as possible and a good way of doing this is shown in the sketch herewith. It will be noted that, by the use of blocks, the hot-zone lining is relieved of all load except its own weight, the blocks carrying and distributing the weight of the preheating-zone lining. This system also greatly facilitates repairs, for when the 2-in. burning-zone lining is burned too thin (too close to the air-jacket space) it is easily removed and replaced.

Another important feature shown in the sketch is the air-jacket for cooling the hot-zone lining. A solid thick wall will burn out much faster than a thin wall. This is because the cooling effect through the brick will be less and the interior surface temperature higher. Since it is not the temperature in the kiln that harms the brick, but rather the temperature of the brick surface, any cooling of the brick will help a great deal. The amount of air induced need not be great. It will enter the kiln by natural draft and above the burning zone where excess air can do little harm.

A hot lining, if in a softened condition with weight resting on it, will distort and open cracks. But, by employing the above cooling system, even if the inner portion of the lining becomes softened due to high temperature, the outer portion will retain its full strength, due to the air cooling effect. This outer portion of the 2-in. lining will then carry the load and entirely relieve the inner softened portion.

Control of combustion so that a long mild flame is obtained will also greatly aid in efforts to increase kiln life. Excess air invariably means high temperature because the molecules of combustible gas will come in contact with the molecules of oxygen with great facility and result in a short, hot flame. This condition is not only harmful to the kiln lining but also to kiln efficiency and to the quality of the lime. When gas is used as fuel the burner should be such that there will be little gas-air mixing outside the kiln; most of it must take place in the kiln between the decomposing limestone. This condition will give the best kiln life, the best lime and the best efficiency. Many burners are designed to produce an almost perfect fuel gas-air mixture which burns with an explosive velocity and creates a flame only 2 or 3 ft. long, having very high local temperatures. When kilns are operated under these conditions they usually are inefficient in addition to having short life.

Need for Special Studies of Kiln Life

Generally speaking, ceramists have devoted little study to the question of what is best for lime kilns. The majority of lime manufacturers have devoted no study. Therefore only a little is known and there is a great opportunity for development and experimentation. The experimental work could be directed as follows:

1. Different methods of kiln operation could be tried, such as more frequent and more positive lime drawing, different methods of firing, etc.

2. Different designs of kilns could be employed. The use of two burning zones, one high temperature and one low temperature finishing zone, burners designed for retarded combustion, the use of secondary air, kiln-lining cooling jackets and reduction of external combustion space to the minimum—all these might be tried.

3. Experiments could be conducted with basic and neutral linings, such as dolomite, magnesite, fused aluminum oxide and for localized points, carborundum, etc. Cement gun application of neutral refractories over fire-brick lining, the use of more substantial joint-filling material than ordinary fire clay, etc., might be tried.

Nature, Preparation and Use of Pulverized Coal*

Part XV — Practice of Burning Pulverized Coal in Metallurgy—Under Boilers—Possibilities in Shaft Lime Kiln Firing

By Richard K. Meade
Consulting Engineer, Baltimore, Md.

AMONG the first metallurgists to use pulverized coal were the copper smelters. The engineers of the smelter at Murray, Utah, experimented with pulverized coal for heating reverberatory matting furnaces in 1904 but the Canadian Copper Co., Copper Cliff, Ont., was the first company to actually make a permanent installation. Many other copper smelters are now employing this fuel. The original experiments at Murray, Utah, were made with an "Aero" pulverizer, but the Canadian Copper Co. followed the cement practice quite closely both as to the central station plan of pulverizing and as to the methods employed for feeding and burning the coal. One of the newer installations, that of the Nevada Consolidated Copper Co. at McGill, Nev., uses the Holbeck system.

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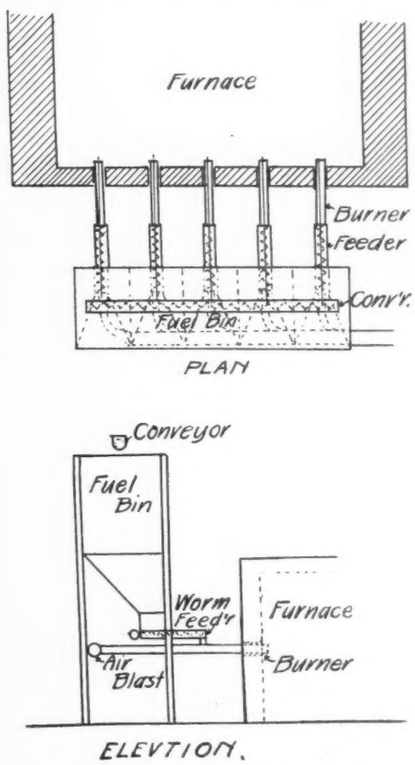


Fig. 48—Pulverized-coal installation for heating reverberatory copper furnace

Fig. 48 gives a general idea of the appearance, etc., of this class of furnace and of the application of pulverized coal to its heating. It will be noted that these furnaces are quite wide and consequently that more than one burner is used in order to distribute the flame over the full width of the furnace.

In the installation shown there is a separate feeder for each burner. It is entirely feasible to split the coal and air stream into two or more branches. The division box shown in Fig. 49 is one method of doing this. In this arrangement, it will be noted, that there is a deflector plate which can be adjusted so as to divide the coal between the two branches in any desired proportion. By the use of several of these boxes the stream may be split as often as desired. This allows one Aero or other unit coal pulverizer to be used for heating a wide furnace. The multiplication of feeders is often undesirable and by employing some arrangement of this sort one feeder can be made to do where two or more fuel jets are required.

Heating furnaces do not differ very materially from the reverberatory furnaces of the copper smelters. They are usually much smaller but follow along the same general lines. They vary very greatly in size, ranging from small square ovens to long rectangular hearth furnaces. They are generally heated from one end but when used for annealing a very even temperature is desired throughout the entire furnace and, if this latter is long, burners are often inserted in the sides also.

The apparatus employed at different works varies according to the ideas of the men in charge, but any of the standard forms of feeder and burners can be used to advantage. Generally speaking, uniform temperature is desirable if not actually a requisite and consequently the arrangements for supplying both coal and air must be susceptible to quite nice regulation. When the furnaces are large this is not difficult, but with small furnaces care must be given to the design and selection of the feeder and burner.

Fig. 50 shows a large annealing furnace. Here coal jets are inserted at each end and the products of combustion are drawn out below along the sides. The top is removable so that the castings can be lifted out.

Fig. 51 shows a small forge furnace heated by pulverized coal employed at the plant of the General Electric Co. This furnace is notable for the arrangement of preheater pipes by means of which the air is heated before going to the burner by the waste gases of the furnace.

Boilers

The application of pulverized coal to boilers proved much more difficult than to metal-

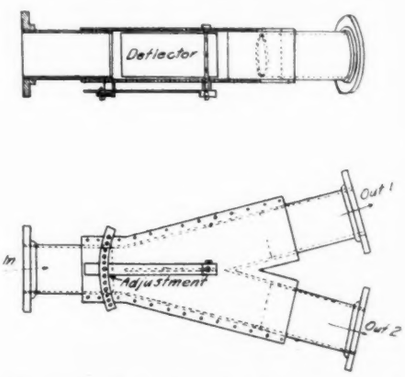


Fig. 49—Valve for dividing stream of powdered coal and air between two furnaces

lurgical furnaces or rotary kilns. This was in many cases due to the effort to employ this fuel in existing furnaces which were designed originally for hand or stoker firing and which were too small or otherwise inapplicable to pulverized fuel. It is now generally conceded, however, that this latter form of fuel can be successfully used for boiler firing, but that its success depends largely on the proper design of the furnace, etc.

The most important consideration in connection with the latter is the size of the furnace and what has been said in the paragraphs under furnaces applies generally to boilers. In designing boiler furnaces, however, particularly when the boilers are in public utility plants, the furnaces must be large enough to take care of peak loads and it should also be remembered that one of the chief advantages of pulverized coal is the ability to force the boilers to a high

rating. The capacity of a boiler that can be developed with this form of fuel depends largely on the size and shape of the furnace. Large furnaces are therefore desirable and aside from space occupied and cost of construction there are no drawbacks to them.

Good results can be obtained with pulverized coal when the relation between furnace space and coal to be burned ranges between 0.75 lb. and 2 lb. of coal burned per cubic foot of furnace space. Assuming 3¼ lb. of coal per horsepower per hour, a boiler designed on the basis of 0.75 lb. of coal per cubic foot of furnace should have 4.35 cu. ft. per horsepower rating. If this boiler was forced to 250% of rating, the combustion would be at the rate of 1.88 lb. per cubic foot of combustion space, etc. Since boilers are rated on the basis of 10 sq. ft. of boiler heating surface for one horsepower, this gives a relation between furnace and boiler heating surface of 0.435 cu. ft. of furnace combustion space per square foot of boiler heating surface. The furnaces of most modern boiler plants employing pulverized coal for heating are designed when desired for high ratings with a ratio of from 0.35 to 0.7 cu. ft. of furnace space per square foot of boiler heating surface, with about 0.4 as a good average for ordinary conditions. Where the boiler is liable to heavy forcing this should be increased to 0.6 or 0.7 cu. ft. per sq. ft. heating surface.

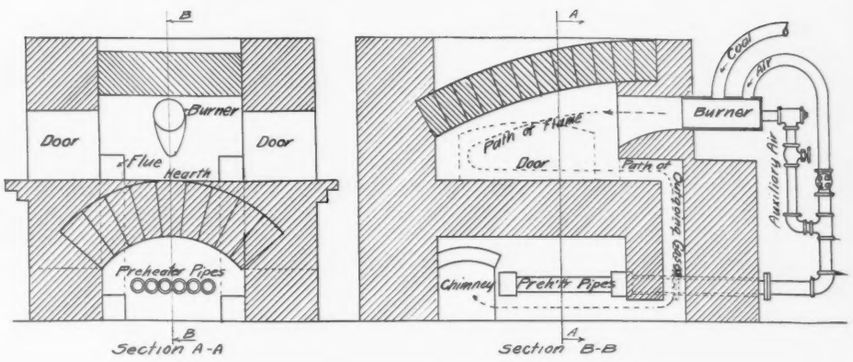


Fig. 51—Powdered-coal furnace with preheater

Any number of burners may be used for each furnace. With small boilers (less than 300 hp.) one burner will be enough, but with larger units two or more burners are employed. At the Lakeside station of the Milwaukee Electric Railway and Light Co. six burners are used for each 1300 hp. boiler.

Burners may be divided into two types—those arranged for vertical firing and those for horizontal firing, Figs. 52 and 53 (see also Figs. 36 and 37, July 12, 1924, issue). With the former the jet of burning fuel is directed downward and with the latter the jet is directed across the furnace toward the boiler. The vertical type is considered to be better for fuels low in volatile matter such as anthracite and semi-bituminous coal, while the horizontal type is supposed to be better for coal high in volatile matter such as bituminous coal and lignite. Some engineers, however, use the vertical type with all kinds of coal. More coal can be burned per cubic foot of furnace space with the horizontal system than with the vertical, but the former permits of a better arrangement for admitting air.

The burner jet is usually flattened out so as to give a fan shaped flame jet and about 20 to 30% of the air necessary for combustion is blown or sucked in with the coal. The remainder of the air accessory for combustion is usually admitted along the front and side walls of the furnace in order to keep them cool. Water-cooled pipes are also used.

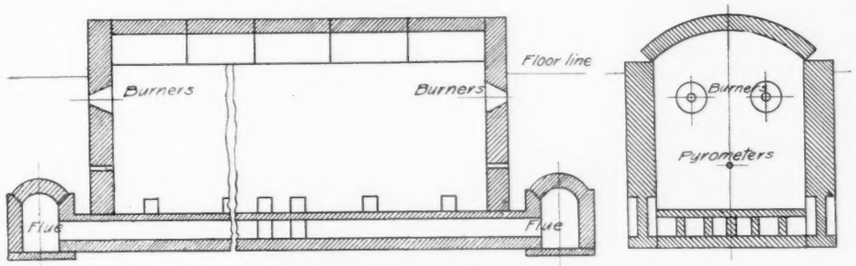


Fig. 50—Large annealing furnace

In some instances these are laid along those portions of the wall which are especially subjected to scorrification by the flame. It is also quite common now to provide a water screen between the ash pit and the combustion furnace.

Fig. 52 shows an arrangement of furnace employed for heating 1306 hp. horizontal water tube boilers at the Lakeside station of the Milwaukee Electric Railway and Light Co., Milwaukee, Wis. This shows the air ports and the position of the burner. It will be noticed that this furnace contains a water screen over the hearth. This is made of 4-in. pipe and is connected into the circulation of the boiler. The hollow wall construction will also be noted.

Fig. 53 shows the installation of a 500 hp. vertical water-tube boiler equipped for horizontal firing, at the plant of Elines, Inc., Milwaukee, Wis. These boilers are built in pairs with a division wall between, but each boiler is a separate unit. The side walls are heavily reinforced by structural steel members as indicated, while the center wall is ventilated in order to prevent its burning out. This ventilation is effected by means of a horizontal duct passing along the bottom of the wall, from which rise, as will be seen from the plan, groups of 4-in. tile on 36-in. centers, which in turn discharge into the boiler room. The air circulating through these tile flues keeps the wall cool. The furnace here is designed on the basis of 0.7 cu. ft. of combustion space per square foot of boiler heating surface.

Fig. 47 (October 4 issue) showed an Aero pulverizer heating a boiler at the plant of the Wheeling Steel Co., Wheeling, W. Va., where this type of pulverizer is used for heating boilers with marked success. It will be noted that the vertical system of firing is employed.

Vertical Lime Kilns

The possible application of powdered coal to the heating of vertical lime kilns has been often discussed and several actual trials with this end in view have been made. So far these experiments have not met with sufficient success to warrant their continuance at any plant. For the most part, the efforts have been made by lime men either unfamiliar with powdered coal or else by machinery manufacturers who knew little about burning lime. Generally, efforts have been made to burn powdered coal in existing wood or coal furnaces and in one instance the coal was actually blown into the lime kiln directly just as gas is generally burned.

In most cases where the effort failed, this could have been predicted by anyone well versed in the art of burning pulverized coal. The furnaces have generally been too small, the draft of the kiln insufficient, the methods of taking care of ash inadequate and the admission of air at improper points.

At the same time, it is only fair to say that whoever undertakes to solve the problem must be prepared to do considerable experimenting and that it is doubtful if even the most intelligent pulverized coal engineer could lay out a system which would give satisfaction until after numerous changes had been made. It is not the intention of the following paragraphs to point out the details of the successful application of pulverized coal to lime kilns, but rather to suggest certain lines of procedure most likely to lead to success.

Since much of the labor required in lime burning is expended in stoking the fires, it will be seen that considerable saving could be effected by employing pulverized coal. There would also no doubt result a better lime-fuel ratio and increased capacity of the kiln.

The type of burner will have but little bearing on the success of the undertaking. The amount of coal fed to the furnace should be susceptible of nice regulation and the burner will generally not be required to take care of more than 200 to 300 lb. per hour.

It is probable that the unit system will be most applicable to experimental work because the trial can be made of this system with least expense. One pulverizer can be made to take care of one kiln by splitting the stream of coal and air between the two fire boxes by means of the valve shown in Fig. 49. One pulverizer could also be placed so as to take care of the fire boxes on the same side of two kilns. In making the installation the pulverizers must be so placed as to allow ample room for the use of a bar on the lime in the kiln.

Most existing installations will afford ample room for the installation of the coal pulverizer and the coal could often be carried up the same incline as the stone and dumped into the bins above the pulverizer through chutes from the track over the kilns.

There appears to be no reason for materially altering the lines of the kiln itself. Possibly a kiln drawn in slightly on one dimension at the eyes will give best satisfaction, as this has proved of advantage in gas fired kilns. That is a kiln with an elliptical cross section at the fire boxes, the minor axis of this ellipse being the center line of the fire boxes.

It would seem best to provide the kiln with induced draft rather than to employ natural draft. This would not only allow the capacity of the kiln to be increased, but it would place the draft under control of the operator and also allow greater gas velocity through the kiln which would help take care of the ash.

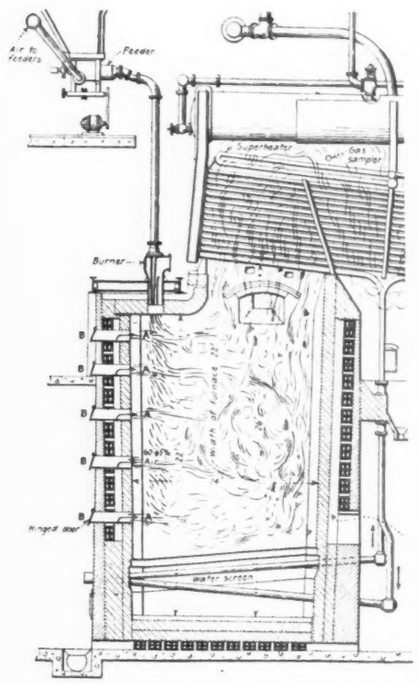
The fire boxes should be amply large. The section of this series of articles dealing with furnaces gave the desired information from which to design a proper furnace. The admission of air will no doubt take some experimenting before the best points are determined. It should be remembered in this connection that a cool flame is desired, not an intense one, such as is employed in cement burning and in metallurgical furnaces. The experimental furnace should be so constructed that its lines may be easily changed, or ports for the admission of air cut in the walls at will. The arch should be kept cool. Water screens might also be of advantage.

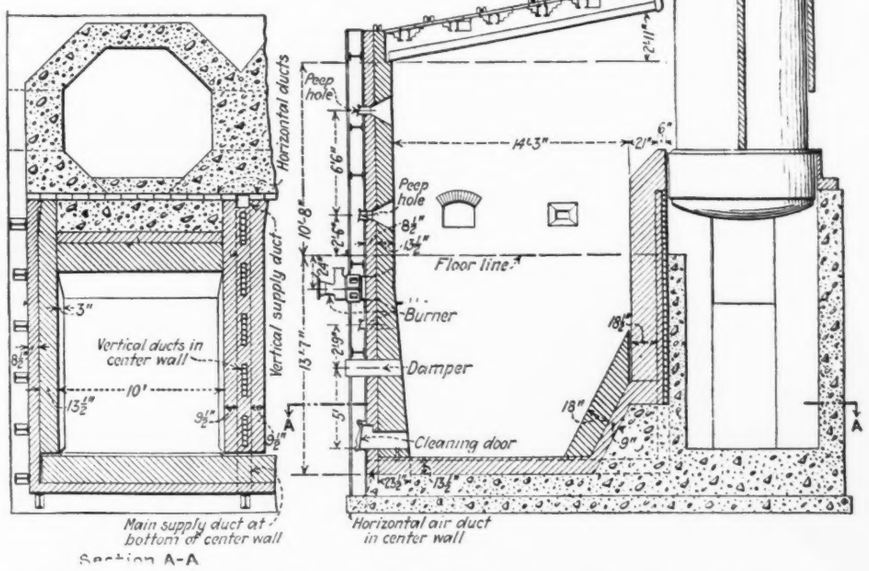
The vertical system of firing would probably be best and steam might even be used in the air blast to advantage. Most lime men are familiar with the fact that steam makes lime burn easier. If the coal is blown in from a bin by means of an injector (Fig. 31, May 31 issue) steam could be used in place of compressed air.

Provision should be made in the furnace design for not only taking care of the ash which settles in the furnace hearth but also for removing from the latter any lime which falls through the eyes of the kiln.

Finally it should be remembered that the average operator does not like new devices and that the lime manufacturer who tries out powdered coal must be prepared to overcome tactfully the prejudice of those around the kilns and to secure their co-operation and help. If this is done these men will often contribute valuable ideas to the success of the undertaking.

(Concluded)





Left—Fig. 52. Horizontal boiler arranged for pulverized-coal firing; right—Fig. 53. Vertical water tube boiler arranged for pulverized-coal firing

Appropriations for Highways in Argentina

THE Argentine Senate on August 19 approved the proposal submitted by the executive, increasing the appropriation fixed by the budget for the current year for the construction and repair of highways from 4,000,000 to 5,000,000 pesos paper, 752,000 for the purchase of road building machinery and equipment, 114,000 for the maintenance and repair of highways and bridges during the last three months of the year and 1,400,000 for the construction of a bridge across the Quequen Grande river; a total expenditure of 3,266,000, in addition to the original amount set aside for these purposes by the current budget.

China Begins Building Good Roads

CONSTRUCTION of a road connecting Yunnanfu and Shetzu, a distance of 96 miles, has recently been started outside of Yunnanfu, Consul Meyers, Yunnanfu, informs the Department of Commerce. The surface of the road is to be four meters or approximately 13 ft. in width. The estimated cost is $9650 per mile.

New Wall-Board of Magnesia Cement Holds Up Under Severe Fire Test

ON the night of August 1 a fire of unknown origin destroyed the fertilizer plant of the Spreckels Brothers Commercial Co., on the outskirts of San Diego, Calif. A greater loss than that sustained was prevented only by the fact that the fertilizer building, as well as three other buildings in the immediate vicinity, was covered with the newly patented wall-board, which confined the fire to this one building and prevented its spread to the warehouse situated 17 ft. away across a spur track. The accompanying photograph shows the close proximity of the building and the remarkable fire resisting qualities of this new product. Only one or two of the boards on the warehouse failed, as may be seen, no doubt, due to intense high water pressure of the fire hose while under extreme heat. The wall-board is of a concrete mixture which depends on an oxy-chloride (magnesia) cement for a binder.

The board, which is approximately ½ in. thick, is composed of a mixture of dolomite, clean washed dry sand and various mineral pulps selected for their resiliency and fire resisting qualities. These ingredients are bound together with an oxy-chloride cement. The process of manufacture takes in the most careful weighing and mixing of the raw materials.

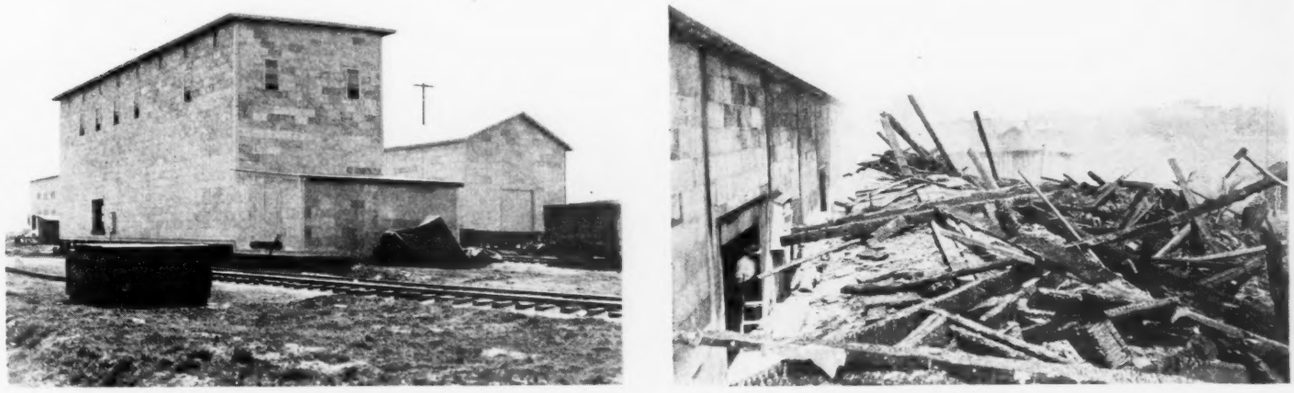
A complete check on the mix is maintained at all times by the laboratories of the company, right on the grounds. The completed mix is subjected to gradually increasing roller presses along traveling belts and is then cut to desired sizes and put in racks, where it attains its initial set.

After the final set the board is removed from the racks and stacked for shipment.

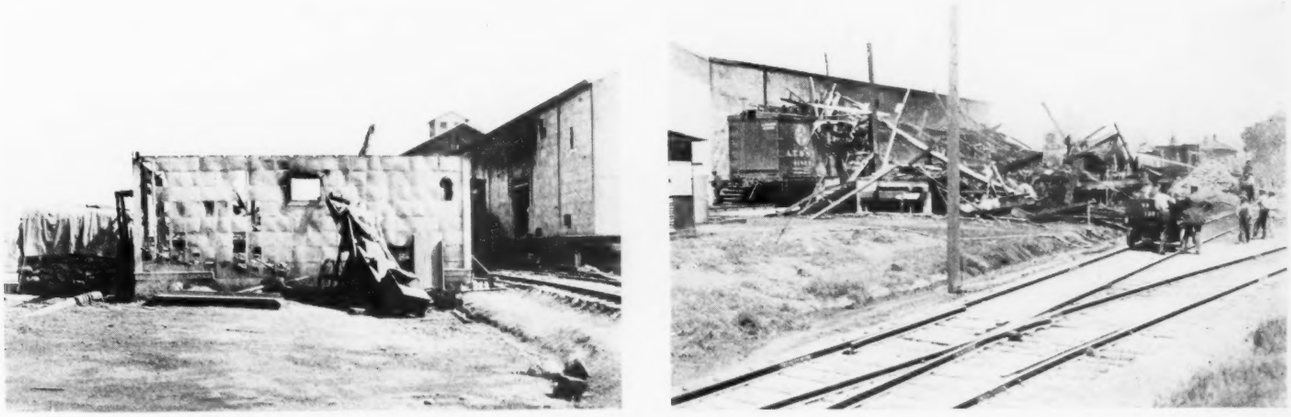
It has been determined by the manufacturers that until the completion of present plans for quantity production no board will be placed on the open market. The Spreckels companies give the assurance, however, that it will be but a short time until their factories will be turning out the board for general distribution at very attractive prices.

Tennessee Marbles

MARBLE deposits of East Tennessee, issued by the Division of Geology, Nashville, Tenn., is one of the best state reports that have been issued of late. It covers the occurrence and distribution of the marbles, their constitution and adaptations and the technology of marble quarrying. The book is beautifully printed and illustrated.



Left—Spreckels Bros. Commercial Co.'s fertilizer factory, San Diego, Calif., before destruction by fire August 1, 1924, showing new composition wall-board in place; right—the same building immediately after the fire; note proximity of warehouse which sustained no damage



Left—Note the studding burned away from inside without materially damaging wall-board; right—composite view of fire; note fireproof quality of wall-board on warehouse adjoining

On the Constitution and Burning of Artificial Portland Cements*

Part VI. A Study of Hydraulic Cementing Materials Other Than Artificial Cements†

By J. E. Duchez

(Authorized Translation from the French Revue des Materiaux de Construction by C. S. Darling)

THE preceding number of this series, published July 26, dealt with the products of incipient and complete fusions of lime, silica and alumina in varying proportions. In this number the natural hydraulic cementing materials are considered.

The principal natural hydraulic cementing materials are:

Light and semi-heavy hydraulic limes.

Natural cements.

Heavy and extra heavy ("limit") hydraulic limes.

For each of these materials, the constituents are the same as for the artificial cements; that is to say:

Silicates of lime, Aluminates of lime } Principal constituents,

with more or less variable proportions of:

Iron compounds, Magnesium compounds, Sulphur compounds } Secondary constituents.

These are without effect or injury, but always form a more or less important part of the product because of the composition of the raw materials.

Finally, the special and inevitable constituents, either from the raw materials or from the fuel, which do not disappear as the result of the burning, the slaking, the grinding, or the mixing, and which we will designate simply as abnormal constituents.

For we do not pretend to be able to study all the compounds of basic salts, with the acids, capable of entering into the chemical composition of the hydraulic cementing materials, whatever may be their purpose.

Our studies are limited to the hydraulic cementing materials in which the chemical composition corresponds to a percentage of each of the following:

Silica	Lime
Alumina	Magnesia
Iron	Sulphuric acid

without any others, for we have admitted the proportions of the other materials in the mass of natural silico-aluminates of lime as being always so small as to consider them as negligible. All other cases are to be rejected or require special studies which could not be undertaken except in particular cases and which present clearly defined interests only for a particular product or a particular manufacture.

To review briefly, we will admit that the principal constituents of all hydraulic cementing materials can be included in three:

Silicate of lime + Aluminate of lime + Lime

the last not being absolutely essential, and that only these three constituents, in the great majority of cases, characterize the hydraulic qualities of the cementing materials, when iron, magnesia and sulphuric acid remain within the accepted limits which all manufacturers recognize.

In principle, and within the accepted limits, iron can be considered as alumina and magnesia as lime. Sulphuric acid must be considered separately.

The materials studied will therefore be:

(Silica + Alumina + Lime) + (Iron + Magnesia + Sulphuric Acid)

$$(SiO_2+Al_2O_3+CaO)+(Fe_2O_3+MgO+H_2SO_4)$$

Influence of Burning on the Nature of the Constituents According to the Physical-Chemical Composition of the Raw Materials

The three principal elements entering into the chemical composition of the hydraulic cementing materials necessarily occur, according to the particular case, in different proportions:

$$a\%SiO_2+b\%Al_2O_3+c\%CaO$$

giving us from the molecular point of view

$$xSiO_2+yAl_2O_3+nCaO$$

As a result of the burning, the reactions produced are identical with those already described in the manufacture of artificial cements with an excess or a lack of lime to saturate the silica and alumina.

If the lime content of a limestone is sufficiently high, the silicates and aluminates formed can always reach the tri-basic limit while leaving an excess of free lime.

$$x(SiO_2 3CaO)+y(Al_2O_3 3CaO)+[n-3(x+y)]CaO$$

and the lime will be as much heavier and more hydraulic for equivalent conditions of burning as the value of n becomes smaller and approaches the value $3(x+y)$.

If n reaches the value $3(x+y)$ the quantity of lime remaining uncombined will be equal to zero and the formula will become:

$$x(SiO_2 3CaO)+y(Al_2O_3 3CaO)$$

We therefore come finally to the formula given by Le Chatelier for artificial portland cements, and as we are considering here only the case of natural raw materials, we will approach the approximate formula of constitution of natural cements, the latter not having any definite formula.

If the lime content of the limestone decreases, that is to say, when n reaches values below $3(x+y)$, the tri-basic compounds of silica and alumina with lime will no longer be assured, at least for one of the elements, and the formulas will become of the form:

$$x(SiO_2 3CaO)+y(Al_2O_3 2CaO)$$

or

$$x(SiO_2 2CaO)+y(Al_2O_3 3CaO)$$

or

$$x(SiO_2 2.5CaO)+y(Al_2O_3 2.5CaO)$$

Now we have shown previously, in a study of the calcium silicates and aluminates (first series of articles), that the setting was as much more rapid as the aluminate formed was less basic. We must accept, therefore, in this case, that the same limestone may give products with different rates of setting according as the lime has been combined with the silicates or the aluminates. Also it will be a question of slow, medium, or quick setting products, according to the relation of the values of n with respect to the values of x and y, and according as the temperature and the time of burning will have permitted the formation of the silica lime or alumina lime compounds of the above formulas.

We will therefore have natural cements which are slow, medium, or quick setting, when the values of n are included between

$$3(x+y) \text{ and } 2.5(x+y)$$

If the lime content grows still less and becomes less than $2.5(x+y)$, the ternary compounds of silica and alumina with lime are no longer assured.

According to the temperature and the time of burning, the products will be of more or

*See *Revue des Materiaux de Construction* for November, 1922, to March, 1923.

†This study of the "Possibilities of Correction of the Set and Strength of Hydraulic Binding Materials" refers to the note of the translator of a communication of the Shaffer Alles Chemical Co., in the magazine, Rock Products, which appeared in *Mines, Carrieres et Grandes Entreprises* for May, 1923, No. 7, p. 356; our texts having been sent to the *Revue des Materiaux* in October, 1922, and the publication having commenced in November, 1922.

less rapid set, but if the lack of lime cannot be, in order to give a hydraulic product, below 3x or 3y, that is to say, one of the elements, silica or alumina cannot always combine with three molecules of lime, it is none the less true that slow cooling will hinder the formation of a tri-calcium silicate and consequently that of the tri-basic aluminates.

Therefore it is practically certain that when the value of n is below $2.5(x+y)$ neither the silicates nor the aluminates will be tri-basic; in any case the presence of the di-calcium silicate $SiO_2 2CaO$ cannot be denied since the presence of the di-calcium powders has been shown at the bottom of the kilns.

Here we get into the category of the extra heavy, or "limit," limes and the conditions of set become very slow if there is a deficiency of alumina. The density of these limes is high; they belong to the limes called "heavy," and their hydraulic qualities rapidly decrease in proportion as the lime content becomes less than $2.5(x+y)$, practically disappearing when the formation of $SiO_2 2CaO$ is no longer possible.

Considerations Concerning the Hydraulic Index

Two limestones of identical chemical composition necessarily have the same apparent hydraulic index. That does not mean, as we have often heard, that they give limes of equal hydraulic qualities.

First, the physical-chemical state of the elements plays a determining part. They may find themselves in the presence of one another in different granular states, causing the reactions of burning to be more or less difficultly accomplished, and sometimes even impossible. If the silica is in the limestone in the form of quartzite, its combination with the lime becomes practically zero and the burning, instead of giving silicate of lime, gives mixtures of lime and silica in the form of sand.

(1) $SiO_2+2CaO_3=SiO_2+2CaO+2CO_2$

instead of

(2) $SiO_2+2CaCO_3=SiO_2 2CaO+2CO_2$

while if the silica is in the state of wollastonite in the limestone, the reaction is already made easier and the burning of the limestone becomes easier.

(3) $SiO_2CaO+CaCO_3=SiO_2 2CaO+CO_2$

Here, therefore, are three limestones having the same apparent hydraulic index and requiring to give a hydraulic cementing material different conditions of burning. Limestone No. 1 can be decarbonated, but it is impossible to burn it at the temperatures of the lime kiln in order to obtain the silica lime compounds.

Limestone No. 2, although constituted like the preceding one, but having for the silica a finer granular state than limestone No. 1, can be burned at the temperature of the lime kiln, but it requires a longer time of burning than for limestone No. 3 and also a higher temperature to obtain the formation of $SiO_2 2CaO$.

From this it results that when burned at the same temperature for an equal length of time these three limestones will give limes of the same apparent indexes but of quite different hydraulic qualities, even with no hydraulic qualities for limestone No. 1.

It is certain that the real index of lime No. 1 will be different from those of limes Nos. 2 and 3, but it will be the same for Nos. 2 and 3, or very nearly the same, while the limes will possess different qualities if the compounds are not complete for one of them.

These points are still more marked if the alumina acts like the silica.

The presence of alumina lowers the fusing point and consequently facilitates the solution of the elements one in the other. The solution of lime in the silica, and consequently the formation of the silicates of lime, will be at a lower temperature and in less time than for the limestones which have a low or no content of alumina.

Alumina will absorb limes more readily to form calcium aluminates than silica, and for the same temeprature and a shorter time of burning, the aluminates will form more readily than the silicates of lime. According to the temperature and time of burning, there will result also aluminates more or less basic and as much less basic as the temperature in relation with the time is lower.

Limestone No. 4, therefore, can give at least the five compounds below (4):

$$(4)\quad SiO_2+Al_2O_3+5CaO \begin{cases} SiO_2 2CaO+Al_2O_3 3CaO & (a)\\ SiO_2 2CaO+Al_2O_3 2CaO+CaO & (b)\\ SiO_2 2CaO+Al_2O_3 CaO+2CaO & (c)\\ SiO_2 3CaO+Al_2O_3 2CaO & (d)\\ SiO_2 3CaO+Al_2O_3 CaO+CaO & (e) \end{cases}$$

In each of these compounds the silica is in a soluble state. Therefore, each one will have the same real index but will present a particular formation of crystals of hydration, according to the nature of the silicate of lime, the aluminate of lime, and the quantity of oxide of lime remaining free.

At first, theoretically, the compounds *a* and *d*, which contain no free lime, require no preliminary slaking; the compounds *b*, *c*, and *e*, which all contain free lime, require slaking before they are used.

The hydration of the silicates will take place in a certain quantity of water, according to the lime content

$$SiO_2 3CaO+4.5H_2O=SiO_2 CaO 2.5H_2O+(2CaOH_2O)$$
$$SiO_2 2CaO+3.5H_2O=SiO_2 CaO 2.5H_2O+CaOH_2O$$

and it will be the same for the aluminates

$$Al_2O_3 CaO+6H_2O=\tfrac{1}{3}(Al_2O_3 3CaO 12H_2O)+\tfrac{2}{3}(Al_2O_3 3H_2O)$$
$$Al_2O_3 2CaO+9H_2O=\tfrac{2}{3}(Al_2O_3 3CaO 12H_2O)+\tfrac{1}{3}(Al_2O_3 3H_2O)$$
$$Al_2O_3 3CaO+12H_2O=(Al_2O_3 3CaO 12H_2O)$$

as well as for the free lime

$$CaO+H_2O=CaOH_2O$$
$$2CaO+2H_2O=2(CaOH_2O)$$

If we admit that the hydrated alumina must combine completely with the free hydrated lime in the compounds or with the hydrate of lime liberated from the hydrated silicas, the five reactions will give the same final products:

$$SiO_2 CaO 2.5H_2O+Al_2O_3 3CaO 12H_2O+CaOH_2O$$

requiring, consequently, $15.5H_2O$ to assure the crystallization giving the maximum needles or lamellas of silicate and of aluminate and the minimum hexagonal crystals of hydrate of lime; while without taking account of this last condition, it will be sufficient to give to each of the five compounds the exact amount of water necessary to the crystallization of the elements to obtain setting materials. (See reactions *a* to *e* below.)

Determining the Water Used

Now, the only means placed at our disposition to determine the quantity of water is the gage (or plumb) of Tetmayer; this is based on a principle of physics: resistance of a paste to the penetration of a mass under a certain surface in a determined time. It obeys, therefore, only the physical phenomena of absorption of water by the material under consideration; that is to say, the quantities of water fixed by the constituents during the period and under the action of the mixing; but the chemical conditions of the reaction of the set remain independent, since the determinations of the plumb are terminated before the set can have commenced. What indications will the Tetmayer plumb give for the above mixtures—15.5, 13.5, or $11.5H_2O$? We can only put down an interrogation point. All that can be said is that all limes of the same chemical composition and consequently of the same real index, since in all the silica is in a soluble state, present different charac-

Reaction a:
$(SiO_2 2CaO+3.5H_2O)+(Al_2O_3 3CaO+12H_2O)$
equivalent to $15.5H_2O$

Reaction b:
$(SiO_2 2CaO+3.5H_2O)+(Al_2O_3 CaO+9H_2O)+(CaO+2H_2O)$
equivalent to $14.5H_2O$

Reaction c:
$(SiO_2 2CaO+3.5H_2O)+(Al_2O_3 CaO+6H_2O)+(2CaO+2H_2O)$
equivalent to $11.5H_2O$

Reaction d:
$(SiO_2 3CaO+4.5H_2O)+(Al_2O_3 2CaO+9H_2O)$
equivalent to $13.5H_2O$

Reaction e:
$(SiO_2 3CaO+4.5H_2O)+(Al_2O_3 CaO+6H_2O)+(CaO+H_2O)$
equivalent to $11.5H_2O$

teristics as a result of the temperature and time of burning.

It remains evident that the final product may be the same for all these limes, but it is none the less true that the beginning of the set will be different; it is sufficient to take care to examine carefully the progress of the first crystallization. The entanglement, the cohesion and the adhesion of the crystals—will these be the same according to the time when the hydration of the aluminate and the silicate takes place, and how will the needles and lamella of silicates and aluminates in the hexagonal crystallizations of the free hydrate of lime, or that liberated by the silicates, react? Will there necessarily be a complete transformation of the alumina hydrates into hydrated tri-calcium aluminates if the crystallization of the lime is too far advanced or retarded? We believe in different crystallizations of these five combinations and consequently different cohesion and adhesion of the crystals giving products of unequal strength.

Apparent Index Not Reliable

So far as the value of the limestone from the point of view of the manufacture of a hydraulic cementing material is concerned, the apparent index tells absolutely nothing that is accurate outside of the possible utilization or discarding of the limestone.

Regarding the value of a hydraulic cementing material (understand that we do not refer to raw limestone, but to burned limestone), the real index gives no possible indication of comparison because products of the same indexes may present qualities of strength and setting clearly different according to the manner of burning. We want to make it clear that we are taking no account of the other phases of manufacture, particularly grinding.

Our opinion on the value of the indications given by the hydraulic index is therefore quite clear. The real index has a value only as an element of comparison for limestones. It gives no exact indication for the value of the hydraulic cementing materials, when it is a question of elements of the same index or approximate indexes.

(To be continued)

A Third Unit Added to Signal Mountain Plant

THAT work on a third unit, to be placed in operation by spring of next year, will be put under way shortly by the Signal Mountain Portland Cement Co. seems now practically assured. It is predicted that at a meeting of directors, to be held next month, officers of the company will be instructed to proceed with the work.

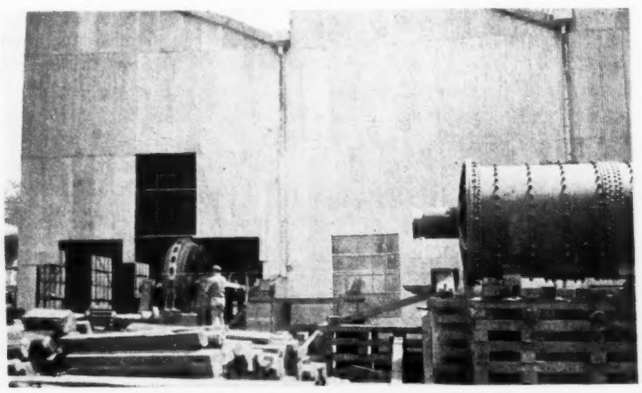
This third unit was first considered at the last annual meeting held here, and at that time it was decided to go ahead when business justified it. At the present time the Signal plant has two units in operation, and in order to meet the brisk demand for its product the two original units are being operated at above their rated production capacity, Vice-President C. S. Steward stated, in commenting upon the expansion.

The Signal Mountain Portland Cement Co. is one of Chattanooga's newest large industries. Its plants and properties are located at the base of Signal mountain, just off the Signal mountain highway and car line. The plant is now producing about 3,000 bbl. of cement a day, which is its present maximum capacity.

The new unit, when in operation, will increase the capacity of the industry to about 4,000 bbl. of cement a day, the official stated. No estimates of the cost of the additional unit are available at the present time. The plant was so designed as to provide for the addition of units as business of the company increases.

The Signal plant is declared by experts to be one of the most modern and efficient in existence. Its product has found a ready market, and the industry promises to develop into one of Chattanooga's largest enterprises. —*Chattanooga News.*

Slurry tanks and kilns at Signal Mountain



Installing new tube mill and motor for third unit

American Portland Cement Company to Build Plant

ACCORDING to the *Flushing (N. Y.) Journal,* arrangements have been made with the Fuller Engineering Co. by the American Portland Cement Co., Inc., of Little Rock, Ark., to build a new plant.

Montana Tests on the Agricultural Use of Gypsum

A CHECKUP on the results secured in the last summer's test with gypsum in Sanders county, Mont., confirms results obtained in previous years, according to Prof. Edmund Burke of Montana State college. Farmers in different parts of the county reported increased yields from the use of gypsum running as high as 200 per cent and a conservative estimate of the average increase would be around 100 per cent.

Laboratory tests to determine the protein content of plants grown on gypsum-treated soil and plants from untreated soil, continued to show a decided increase for the treated land. Alfalfa from untreated land showed a protein content of 18.84 per cent while that from treated land showed 24 per cent, an increase of 27 per cent. Clover from untreated land had a protein content of 7.31 per cent and clover from treated land showed 9.87 per cent protein, an increase of 35 per cent. Another test on alfalfa showed a 94 per cent increase in protein content.

Observation of fields of alfalfa and clover on treated and untreated soil indicated clearly the beneficial results of gypsum. In sections where rainfall had been fairly low during the summer untreated fields appeared brown and practically at a standstill, while gypsum-treated fields were green and growing well.

Two other counties, Flathead and Lincoln, are planning gypsum tests for the coming year, as a result of the success obtained in Sanders.—*Billings (Mont.) Gazette.*

Golf Club Protests the Removal of Gravel from Land

MEMBERS of the Observation Community club of Duluth, Minn., at a meeting held recently, appointed a committee of three, including William Cutliff, Oscar Lavin and John Youngdahl, to see Mayor Snively concerning the Whitney Brothers Co. sinking test pits for gravel on the propery condemned for park purposes at Enger park. Members of the club emphasized the fact that if gravel were taken out, it would prevent enlarging the municipal golf course.

Tentative Program for National Crushed Stone Convention

Committee Work and Reports to Be Important Feature

MEETING at the Commodore Hotel, New York City, October 25, the convention committee of the National Crushed Stone Association, of which Otho M. Graves is chairman, adopted the following tentative program:

MONDAY, JANUARY 12

10:00 A. M. Greetings by the Mayor of Cincinnati. Response by Otho M. Graves, First Vice-President, National Crushed Stone Association.

10:30 A. M. Annual address of the President of the National Crushed Stone Association by John J. Sloan, Chicago.

Appointment of Convention Committees on:

1. Resolutions
2. Auditing
3. Nominations
4. Rules and Procedure

11:00 A. M. Business Session devoted to 10-minute reviews of industrial conditions and the outlook in the quarry industry by members of the Board of Directors of the National Crushed Stone Association.

1:00 P. M. Standing Committee Meetings and Luncheons in separate dining rooms.

2:30 P. M. General Business Session—Reports of directors on business conditions continued.

3:30 to 6:00 P. M. Inspection of exhibits of the Manufacturers' Division of the National Crushed Stone Association in hall adjoining the meeting room.

8:15 P. M. Moving Pictures.

9:15 P. M. Smoker, Entertainment, Eats, etc.—Subject for discussion, "What Should a Regular Fellow Do Between Midnight and the Time to Go to Bed?"

TUESDAY, JANUARY 13

8:00 to 10:00 A. M. Exhibition Room is open for inspection and business.

10:00 A. M. Address by a national authority on highways.

10:30 A. M. Report of the Standing Committee on Railway Rates and Immigration.

11:00 A. M. Discussion of the Activities and Value of Local or District Crushed Stone Associations.

11:30 A. M. General Business Session.

12:00 A. M. Address by a prominent highway engineer.

1:00 to 3:00 P. M. Committee Meetings and Group Luncheons.

3:00 to 6:00 P. M. Exhibition.

6:30 P. M. Annual Banquet of the National Crushed Stone Association.

WEDNESDAY, JANUARY 14

10:00 A. M. Address on Income Taxes by a national authority.

10:30 A. M. General Business Session.

11:00 A. M. Address by prominent railway maintenance-of-way engineer.

11:30 A. M. Reports of Standing Committees on Research, Highways, Railway Ballast, Concrete Aggregates, etc.

1:00 to 3:00 P. M. Group luncheons and meetings by Geographical Divisions.

Make Your Hotel Reservations Early

THE NATIONAL CRUSHED STONE ASSOCIATION will hold its next annual convention at the Hotel Gibson, Cincinnati, Ohio, January 12, 13, 14, 15, 1925.

Unusually good provision has been made for meeting room and exhibition space.

Plans are being made for the biggest and best convention in the history of the quarry industry.

Wise quarry operators will make their plans to attend now.

A. P. Sandles, Secretary, National Crushed Stone Ass'n, 405 Hartman Building, Columbus, Ohio, will see that you are taken care of.

3:00 to 6:00 P. M. Exhibition.

8:00 P. M. Theater Party—for ladies (and children).

THURSDAY, JANUARY 15

10:00 A. M. Address by prominent state highway authority.

10:30 A. M. Annual Business Meeting and Election of Officers.

11:00 A. M. Address by expert on "Coal—Its Varieties, Properties and Uses."

11:30 A. M. Unfinished Business.

1:00 P. M. Get-together Luncheon.

3:00 P. M. Meeting of the Directors and Committees. Exhibition.

Special importance is laid on the work and reports of the various standing committees of the association. The chairman of each committee will be responsible for the program of his group luncheon and meeting; and these meetings of the committees will be open to all interested parties, whether members of the committees or not.

Value of Tests on Molding Sand

ACCORDING to an editorial in the *Iron Age*, a great deal of credit is due to those energetic and progressive men who have carried forward the investigations on molding sand, reported from time to time at the foundrymen's conventions. They set out to discover the characteristics of a good sand, even to resolve the problem into its elements, so that one could blend local sands and clays into a mixture satisfactory to the molders. A difficult problem indeed! Hard even to state, for the journeymen had always relied upon some rule-of-thumb tests, which were next to impossible to translate into quantitative data. Apparently it was another proof of the saying, "The older the art, the less that is really known about it."

The goal of the research has not yet been reached, but a remarkable advance has been made in a few years. It was evident at the outset that whatever else a good molding sand should be, it should have sufficient bonding power to retain the shape of the pattern, it should be porous enough to allow the escape of steam and gases driven back by the hot metal, and it should not melt in the heat or stick to the casting. Evidently it was first necessary to find tests for bond, moisture, permeability and refractoriness—not such tests as scientists already might be using, but tests which could be made in a few minutes, with quite simple apparatus, and right on the job.

Such tests for bond, moisture and permeability have been devised, and have been systematically used in some of the leading foundries long enough to establish their value without question. The ultimate goal of the research has not yet been reached—which is not surprising in the least. Not enough is known about what is responsible for the bond in a sand, for instance, to make it possible to compound a molding sand like a prescription. However, things have gone this far: if a given heap of sand will work satisfactorily, it is possible by means of the tests to reproduce that heap from the original materials time after time, indefinitely. In other words, it is now possible for a foundry to standardize on a certain sand—and reproduce that sand at will.

It is to be expected that the empirical figures for moisture, bond and permeability used for standards by an eastern plant making brass castings in Albany sand could hardly be found to give best results in an Illinois iron foundry using local sands. However, that should not deter one from using the tests. A little experimentation with the heaps actually on the floor, and you have your own target to shoot at.

That the effort is worth while may be gathered from some statements made at the Milwaukee meeting. When the sand is right and is kept right, the rejects and foundry returns drop to half their former number. Not content with this, one plant finds that all its old sand can be reclaimed. It is riddled and then mixed with a determined amount of high-bond local sand in a muller. Several months' operations in this manner have reduced the sand cost per pound of castings by approximately one-half.

A saving of half of the sand cost and half the rejects is certainly worth the trouble. We would imagine, however, that the matter may be carried further.

Hints and Helps for Superintendents

Winter Drilling with a Portable Electric Air Compressor

By D. C. HENDERSON
Winnipeg, Manitoba

AT the quarry of the Winnipeg Supply and Fuel Co., Stonewall, Manitoba, where the quarry face is only 8 to 12 ft. in height, a Chicago Pneumatic Tool Co. portable electric compressor delivering 210 cu. ft. per minute and an Ingersoll Rand DDR 13 hammer drill take care of all the primary and secondary drilling over 1800 ft. of face.

For summer operation the compressor is moved as desired by a team of horses, perhaps once every two or three days. The wires for the electric power are carried by poles placed in the overburden back from the face. There are four poles at which the machine may plug in, and with 300 ft. of armored cable the compressor may work at any place along the whole 1800 ft. of face. The poles are back far enough from the face that the poles will not have to be moved for a couple of years.

It is the intention to change the Keystone excavator, which takes care of the 5 to 10 ft. of overburden, from steam to electricity and thus utilize the wiring for both drilling and stripping operations.

As it is necessary to operate the quarry continually the year around, winter drilling is essential and the methods used at this quarry are rather unusual.

The compressor has been set up in a central position above the face, and the wheels removed and the whole outfit made solid. The radiator has been removed and the compressor cooling system is directly connected to a barrel of water which is drained each night and filled in the morning. The entire machine is enclosed by a lean-to shed taken from an old house and a heater has been put in the corner to moderate the temperature. An additional air receiver is installed outside the shed. Thus moist air is avoided at the drill and no trouble from freezing experienced. A pipe line runs along the top of the face from the receiver, and the drill may operate for a distance of 300 ft. along the face.

Drilling was carried on all winter in spite of 30-below weather, which is quite frequent during January and February in Manitoba. Absolutely no trouble of any consequence resulted from this arrangement and the compressor and drill gave excellent satisfaction. The drill man looks after the whole outfit and is able to give all his time to drilling except for filling the wooden radiator barrel each morning.

The compressor has been housed in at a central point and the radiator removed so that the cooling system can be directly connected to a water barrel that is emptied at night. An additional air receiver keeps moist air from the drill and no trouble from freezing is experienced

Prevention of Accidents from Rotating Shafts

IT is possible practically to eliminate the danger from moving shafts in a well-designed plant. Where the shafting is installed overhead, runways should be made a permanent part of the structure and of sufficient width. They should be provided with hand rails and toe boards on both sides. The shaft should never be considered as a hand rail, because therein lies one of the principal sources of danger. The railings are designed to prevent a man from falling from the platform and from coming in contact with the moving machinery. If the runway is provided with hand rails on the side away from the shaft only, the oiler is inclined to consider the shaft as a means of support in case of losing his balance while on the runway. A railing should therefore be installed on the shaft side of the runway in such a way as effectively to prevent anyone from coming in contact with the shaft unless it be done deliberately.

One of the four plug-in boxes by which the whole 1800 ft. of space may be worked

Where the shafting is mounted beneath the floor the problem is different. Often the attendant has to work in spaces that are more or less cramped, and he is therefore in dangerous positions. As far as possible, no oiling of machinery in basements should be permitted when the machinery is in motion. If this is not possible there should be provided well-defined passageways with sufficient room overhead to permit a man to walk comfortably. They should be railed off from moving machinery in accordance with standards adopted for guarding ma-

chinery along commonly used passageways.

Where a passageway crosses under the shaft and it is impracticable to provide sufficient headroom the shaft should be boxed in at such points or provided with a loose sleeve. The sleeve should be free to rotate with the shaft, but should be so mounted that in case anyone comes in contact with it the sleeve will cease rotating, thereby eliminating the danger of anyone being caught on the shaft. It is preferable that this sleeve be made of metal, securely fastened around the shaft. As a convenient substitute, however, paper mailing tubes of the proper dimensions can easily be placed on the shaft and held in position with friction tape. This provides as satisfactory a safeguard as the metal tube, except that its life is not so long. It has the advantage of creating less noise in case the shaft vibrates appreciably.—*California Safety News.*

Gate Prevents Crusher Choking

THE picture shows a gate placed before a gyratory crusher to prevent its being choked when large pieces are dumped into it. The mouth of the crusher is about 10 ft. below the quarry floor, the space between the crusher and the floor acting as a receiving hopper.

The gate is a triangle, the apex pointing toward the quarry and the base being above the crusher. It is made of heavy timber and has two steel plates on the sides of the triangle to resist abrasion. The triangular shape is to split the flow of the rock and to keep the crusher from being buried.

The point of the gate can be lifted by a chain block. The chain and the stirrup attached to the gate shows in the picture.

The triangular gate splits the flow when the crusher is shut down

This gate is especially useful when the crusher is shut down for any reason. The men at the quarry keep on dumping cars so long as there is room, but the crusher is not buried so long as the gate is down. When the crusher is running again the gate is lifted, allowing the rocks to roll into the crusher mouth.

The picture was taken at the Rockville quarry, Harrisburg, Penn.

Getting Supplies to Well Drills

WELL drills working on the top of a high quarry face often offer a problem of transportation of supplies. The ground between the drills and the storehouse at the railroad siding is usually rough and broken and to build a road for trucks is rather expensive.

Track for bringing supplies to well drills

The picture shows the way this problem has been solved at the quarry of the Bound Brook Crushed Stone Co. at Bound Brook, N. J. A narrow gage track was put in from the top of the face, near where the drills are working, to a point that could be easily reached by trucks. This track could be laid on a steeper grade and could be made at less expense than a road. The motive power is furnished by a small compressed air hoist which takes the air from the line supplying the air drills used for block holing in the quarry below. A small car completes the outfit. The picture was taken at the level stretch of track which is at the top of the incline.

Commission Refuses to Modify Rates on Sand and Gravel

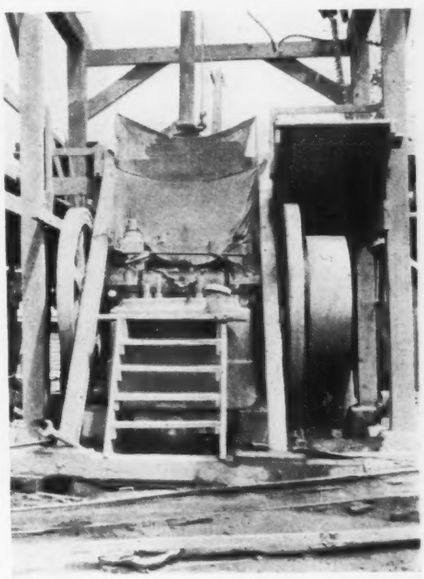
THE public service commission of Indiana in an order just announced refused to modify its recent order in which it directed certain railroads to establish reduced rates on sand and gravel from New Albany. The rates established by the commission were "graduated with due regard for the distance involved and are approximately in line with other rates fixed by the commission in cases involving rates on sand and gravel and building material," the order said.

The commission said it saw no reason why the order should be modified.—*Indianapolis News.*

Curtain Keeps Rocks from Flying

THIS is so simple a "hint" and in such common use that one may wonder at its appearance here. But observation has proved to the editor that conditions about many crushers could be improved by hanging up a few curtains to keep rocks and dust from flying and getting into the machinery and occasionally injuring a man.

The curtains in the picture are ordinary jute sacks split down the side. Old canvas is used in other cases and strips of old belting probably make the best curtain of all. In some cases a curtain or a sort of box of light steel plate has been used. An illustration is found in the description of the Ford glass sand plant on page 35 of the September 20 issue.



Curtains to keep rock and dust from flying

New West Coast Gypsum Products Enterprise

Pacific Portland Cement Company, Consolidated Operating Six-Kettle Plant at Gerlach, Nevada

THE west coast gypsum industry is keeping pace with the west coast portland cement industry in the way of expansion. At least three new plants are under construction, or nearing completion, and as many more are projected. One of the newest of these plants, and undoubtedly one of the most modern in the United States, is the Gerlach, Nev., mill of the Pacific Portland Cement Co., Consolidated. Gerlach is on the Western Pacific R. R., 439 miles from San Francisco, where the company's general offices are.

This company has operated a gypsum plant at Mound House, Nev., for a number of years, and is now operating the new plant at Gerlach, which produces not only gypsum wall plaster but gypsum tile and blocks, wallboard, Keene's cement, and other gypsum products

Electric-Shovel Quarry

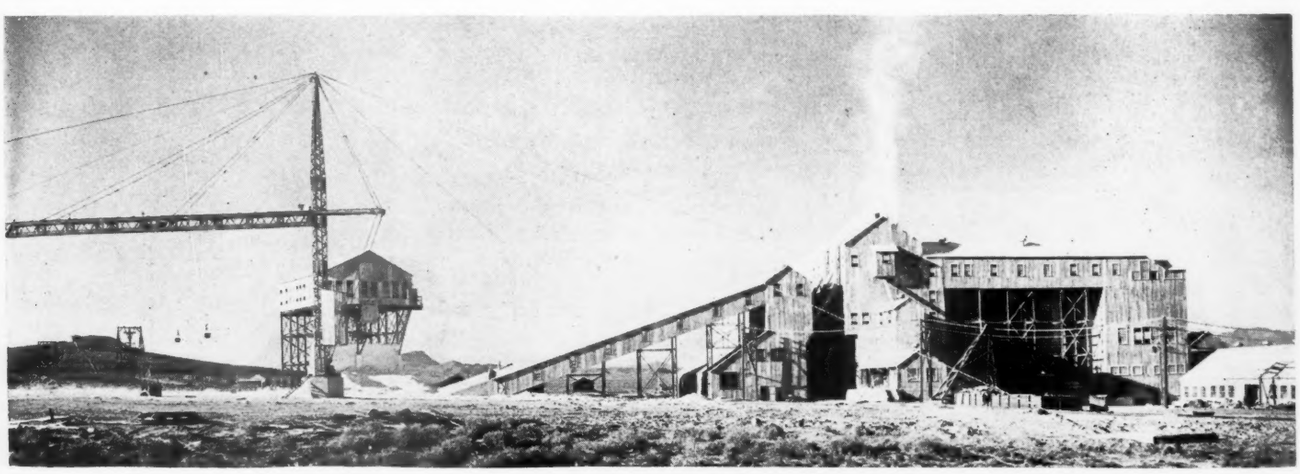
The gypsum deposit is such that it is worked with a Marion No. 32 electric revolving shovel. The gypsum rock is a huge mound in the foothills at the base of a range of granite mountains. The deposit is remarkably pure and clean. The prospecting has been quite thorough and consisted of diamond drill holes, open test pits, tunnels, etc., all of which showed a uniform high purity and lack of waste. Gypsum in rock form comes to the surface of the ground and no stripping will be required.

The electric quarry shovel loads 15-yd. standard-gage, rigid-body, steel cars, which are drawn by a 9-ton gasoline locomotive to the car dumper. A rotary car dumper operated by compressed air turns the cars completely over, so they will dump on to a grizzly feeder 10 ft. long, regulating the feed to a No. 6 Jumbo Williams mill. The Williams mill reduces the product to a ¾-in. size and less at the rate of 100 tons per hour, and discharges the crushed material on to a 24-in. inclined belt conveyor. This conveyor discharges into a 20-ft. diameter concrete bin holding 300 tons of crushed material, from which the aerial tramway buckets are loaded. The tram-loading bin is provided with three air-operated gates for loading 17-cu. ft. tram buckets. The aerial tramway is five miles long. It has a total drop of 850 ft. from the loading end to the discharge end. Due to the ruggedness of the country, the maximum span from tower to tower is slightly over 2000 ft. Using 1⅜-in. lock coil cable on the carrying side of the tramway, there is a carrying capacity of 100 tons per hour. The tramway is driven by one 15-hp. motor located at the lower terminal.

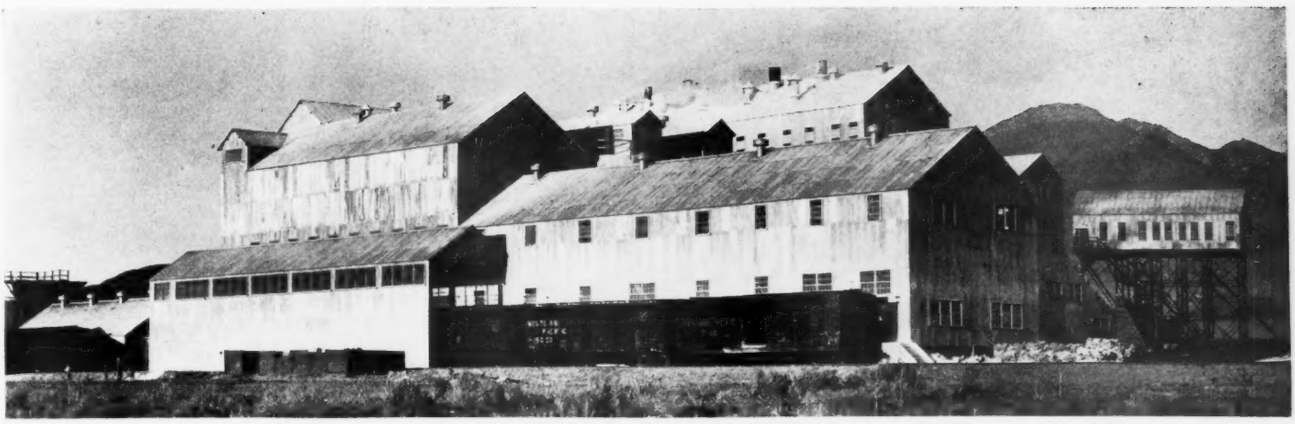
Gypsum quarry of the Pacific Portland Cement Co., Consolidated, Gerlach, Nev., and crushing plant

Ground Storage for Mill Rock

Owing to the practically rainless climate no bin is provided at the discharge end of the tramway. The buckets discharge to an open-air pile, having a maximum height of 35 ft. From this ground storage the crushed rock is removed by a belt conveyor



Tramway coming from quarry, at left, shown behind the revolving crane derrick for recovering ground storage; gypsum mill at the right



Structural steel mill buildings covered with corrugated steel

in a tunnel beneath the pile. On account of winter weather conditions, the quarry and tramway will operate nine months during the year and deliver enough material at the mill to operate it for twelve months

The mill storage will be made and reclaimed by means of a revolving crane derrick, having a 100 ft. radius. This derrick is equipped with a 1½-yd. clamshell bucket and is so arranged that it can get material from the pile made under the tram discharge terminal and distribute this material completely around the mast with a maximum radius of 100 ft. and a maximum height of 30 ft. In reclaiming the storage for mill use the same crane derrick discharges its load into the pile under the tram discharge terminal.

Mill Buildings and Equipment

All of the mill buildings are structural steel, covered with galvanized corrugated steel and provided with concrete floors. The sack repair and packing departments are in one building, paralleling the railroad track. This building is provided with a second floor, also made of concrete. Material is lifted from the first to the second floor by means of a hydraulic elevator.

The raw grinding department consists of six individually motored 5-roller Raymond mills. The fans for these mills are direct connected to their motors. Ground gypsum for calcining or for land plaster is produced by these mills.

The calcining department consists of six 10-ft. diameter by 10-ft. high kettles, made by the J. B. Ehrsam & Sons Manufacturing Co. Each one of these kettles is provided with four 18-in. flues, placed two above two. The driving gear mechanism for the kettles has been placed high above the kettle tops so that the operator will have plenty of height for walking ground on top of the kettles without stooping. The burning is done with fuel oil heated to 180 deg. F. and atomized with air at 2-lb. pressure.

The hot pits are of the usual design and large enough to hold two kettle dumps without raking. From the hot pits to the stock house and to the packing department a double conveying system has been installed so that two different kinds of material can be handled simultaneously through the kettles and to any point beyond.

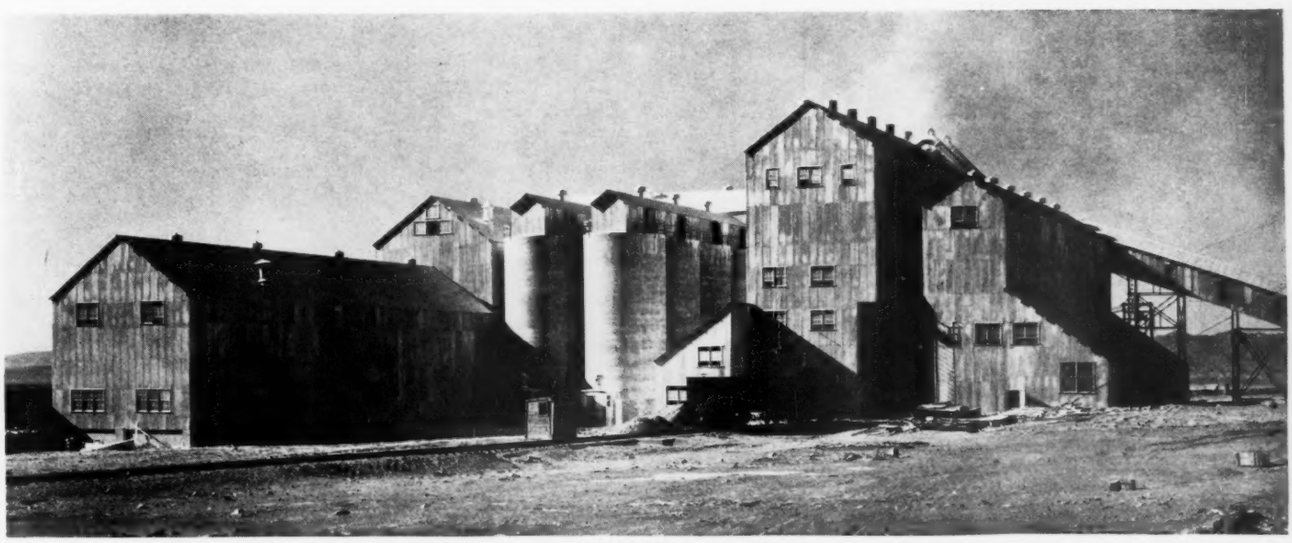
Stock House and Packing Departments

The stock house consists of eight concrete silo bins, each containing 400 tons of finished plaster. The conveying system is so arranged that material from the kettles can be discharged into the stock house or into the packing department bins as desired.

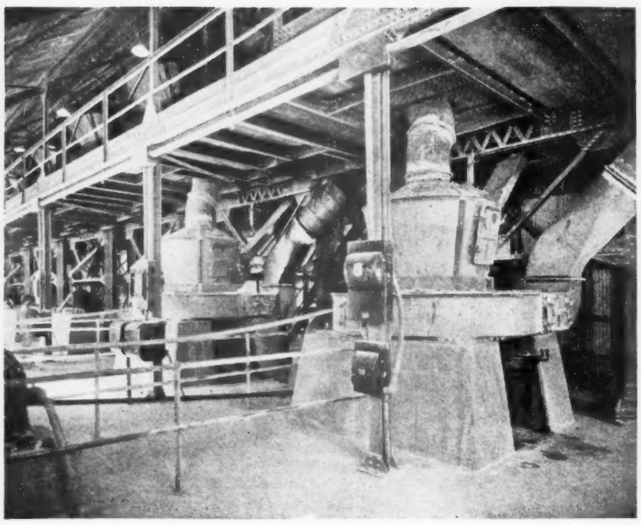
The packing is done on three 3-tube Bates valve-bag packers, so spaced that different cars can be loaded simultaneously, either with the same material or with different kinds of material. These packers are placed close to the front wall of the building and the sacked material is trucked directly into the railroad cars.

Returning, the empty sacks are unloaded from the cars on the tail track of the stock house, cleaned, sorted, repaired and stored on the same floor level as the packing department so that when needed they will have to be trucked only a few feet into the next room. All fiber, hair, retarder, and such, are elevated to and stored on the second floor so that they will be close to the place of using.

Another railroad track runs between the raw grinding department and the calcining



View showing the eight concrete silos for holding 400 tons of finished plaster—unusual storage facilities for a gypsum mill



Battery of six mills with air separators

Packing room with three 3-tube valve-bag packers

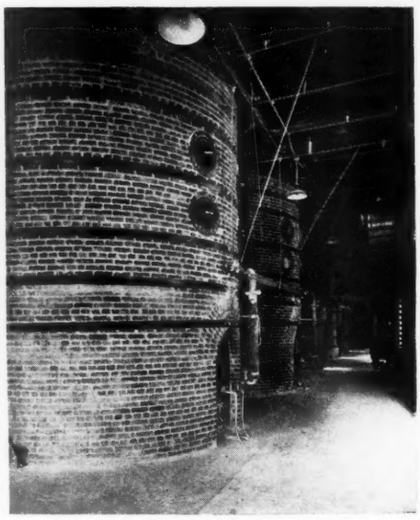
department, separating these two buildings. This track is for the purpose of loading land plaster and raw gypsum for cement mills; the raw gypsum is taken directly from bins, which are so installed that they can feed either directly into open gondola cars or into the raw-grinding mills. This track is provided with a 100-ton track scale for weighing the material, and is likewise provided with tail track room for spotting empties.

The mill is about halfway between the quarry and the main line of the Western Pacific R. R., leaving five miles of railway to be operated by the gypsum company. It is mostly down hill grades and the cars are handled by a 19-ton gasoline locomotive, equipped with air compressors and standard train-control apparatus.

At the mill there are two tracks alongside the packing department, so arranged that switching can be done without interfering in any way with the operation of the packing department, and there is provided track space for 20 empty cars and 20 loaded cars at the same time. The spotting of the cars for the packing department is done by means of an air operated drum hoist.

Electric Power Equipment

This plant does not come in any zone at present furnished with hydro-electric power, so that it was necessary for the company to build its own power plant. This consists of three 800-hp. Price-Bathburn oil engines, each engine direct connected to a 675 kva. General Electric generator, generating current at 480 volts. Due to the high temperature in the summer time, the generators have been provided with temperature coils. As water is scarce, it will be necessary to practice the greatest economy. The circulating water for the engines will be cooled by means of a redwood water tower As the water loss in a cooling tower is more or less proportional to the water passing over the tower, the engine piping has been so arranged that only one-half of the circulating water will pass over the tower, the balance being returned directly into the circulating pump suction. Enough drop in temperature of that part of the water passing over the tower will be obtained to give the necessary cooling effect in the engines.



Six 10x10-ft. calcining kettles

All motors through the plant are 440-volt, 3-phase, 60-cycle, and manufactured by the Westinghouse Electric and Manufacturing Co. The power line carrying 11-kv. current from the mill to the quarry supplies the current for the quarry shovel and crusher.

All machinery units are individually driven by electric motors and in most cases direct-connected, using spur gear reducers wherever possible. All screw conveyors, elevator bins, and such, are made as nearly dust tight as possible in order that working conditions will be agreeable and a minimum expense for clean up and waste.

The entire layout has been made with a view toward safety for employes. All moving parts are entirely protected and stairs, platforms, etc., provided with hand rails, toe guards and such. No ladders are allowed and ample space is provided around all parts for ease in inspection and repair.

Special Features

The entire layout of the mill has been made with a view toward ease and economy, and for continuous operation; consequently, large bins are installed between each of the several operations. All mill bins are of the circular type with conical

Town created at Gerlach by the new mill—a row of company houses

bottoms and made of structural steel and plates. All bins and the stock house for storing finished material are provided with compressed-air agitation in order to keep the material flowing when desired.

As the location is on the desert some distance from any habitation, it was found necessary to build and operate an entire town for the employes. This town consists of 20 cottages, hotel, club house, hospital and office building. Each of these cottages is plastered inside and provided with lights, bath and water, and a concrete cellar. The hotel is provided with steam heat.

A concrete reservoir with a capacity for holding 200,000 gal. of water serves as the mill and town supply.

The office, power house and lubricating oil house are solid monolithic concrete, fireproof structures. The office is equipped with steel shelving for mill supplies, and for commissary supplies, and is also provided with a concrete vault for records.

The Pacific Portland Cement Co., Consolidated, is now building another plaster mill at Plaster City, Imperial county, California, which was to have been in operation about October 15.

Claims City Quarry Makes Money

But It Works the Quarry with Convicts and Production Costs Are $1.71 Per Ton

THE *Durham, (N. C.) Herald* contains the following account of the operation of the Durham city quarry which appears to be doing what so many state and municipal quarries have failed to do, that is, show a profit on operations. However, the report contains two significant facts, the first of which is that convict labor is largely employed and the second that costs are $1.71. They have been $2.15 and $2.05 in previous years. In a locality where common labor is plentiful and receives only 20c per hour, $1.71 per ton would seem plenty for producing ordinary sizes of crushed rock. The report says:

"From a money losing department of the city to one that pays good dividends in three years is the history of the city quarry and rock crusher. When the council-manager form of government was voted in by the people of the city three years ago the quarry was being operated without any special system and was not making money. During the fiscal year of 1923-24 the quarry netted the city a total revenue of $96,679.30 and a profit of $27,697.80. The yearly output also showed an increase during the three years the quarry has been operated under the new form of government and under the direction of H. W. Kueffner, director of public works. The total profits for the three years is $77,280.55.

"Until recently the rock quarry and crushers have been busy supplying crushed stone for street construction, together with other demands, the report submitted by Mr. Kueffner to the city manager states. Street construction work has now ceased, with the exception of the work of repairing macadam streets in the city. Large quantities of crushed rock were necessary in the paving of the streets while much stone was sold to contractors for use in foundations on buildings and for various other building purposes. Large quantities of it are being used in the construction work of the million dollar hotel, it was stated, while some of the churches now being built in the city have required much stone for the foundations.

"Facing competition in the sale of rock by outside firms, the city has been forced to dispose of its rock at a low cost so as to compete in the local market. The stone and gravel prices on large orders, have been lowered to meet the prices on the open market. Rock and gravel is now sold on a sliding scale, depending upon the size of the orders and the kind of stone required. When Mr. Kueffner took charge of the quarry three years ago the city was charging $3.75 per ton for the rock sold. One of the first things he did was to reduce the cost to $3.25 per ton. This move brought forth a protest from one or two of the officials of the city because they feared that the quarry would be made to lose larger sums of money through the reduction. The change went into effect, however, and today it is paying the city greater dividends than possibly any other department in the city.

"The city has operated the rock quarry located on the Bragtown road for the past seven years. It is now being worked by state convict and free labor. The convicts are leased to the city while the free labor is employed in the same manner that employes of other departments are. The convict force now numbers 34 men. They are in charge of a superintendent from the state and under the direction of the city.

"During the year 1921-22, the first year the quarry was operated under the direction of Mr. Kueffner, 31,376 tons of rock were quarried and crushed, bringing a revenue of $92,555.28. The operating cost for the year was $67,608.20, making the profit made by the city for the year's operation $24,947.08. The cost of production per ton was $2.15.

"For 1922-23 the quarry turned out 31,922 tons of rock or 546 tons more than was quarried the year before. It cost $65,597.72 to do the work during the second year while the revenue amounted to $90,233.39. The operation cost showed a decrease of a little more than $2000 while the revenue showed a drop of more than $2000, the one offsetting the other. The cost per ton for production was $2.05 or a decrease of 10 cents per ton, meaning that the city saved the purchasers of stone for the year the sum of $3,192.20.

"For the past fiscal year the quarry produced 40,242 tons of rock, which cost the city $68,981.50 while the revenue amounted to $96,679.30. The amount of rock produced showed an increase to the extent of $6,445.91 over the previous year. The cost of production for the past year was $1.71 per ton showing that the production cost has been reduced each year during the past three."

Gasoline Taxes of Various States

MINNESOTA is expected to be the next state to adopt the "painless" gas tax method of raising part of its good roads funds. Support is being urged for the gas tax amendment to be voted upon this November. A tax levied will only divert receipts from state general expenses and put them into better highways so that highway users will receive the biggest direct returns, according to a ruling by Attorney General Clifford L. Hilton of Minnesota.

A recent gas tax survey of the United States follows:

No gas tax: Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, Ohio, Rhode Island and Wisconsin.

1-c. gas tax: Connecticut, Kentucky, Louisiana, Mississippi, New Mexico, North Dakota, Texas, Vermont and Wyoming.

2-c. gas tax: Alabama, Colorado, Delaware, Idaho, Indiana, Maine, Maryland, Massachusetts, Montana, Nevada, New Hampshire, Oklahoma, Pennsylvania, South Dakota, Tennessee, Washington and West Virginia.

3-c. gas tax: Arizona, California, Florida, Georgia, North Carolina, Oregon, South Carolina and Virginia.

Utah has a 2½-c. gas tax and Arkansas a 4-c. gas tax. Massachusetts will hold a gas tax referendum this month.

Of the 19 states which have adopted the gas tax, 13 have since adoption increased the rate because it was seen that still greater road funds could readily be raised, and 17 states adopted the gas tax last year. It is predicted that within a few years a gas tax will be collected in practically all the states of the union.

The gas tax for the states in which it is in force averages a little over 2 cents on each gallon of gasoline used. Under the gasoline tax automobilists from other states make contribution toward the upkeep of the highways of the states through which they tour.—*Highway Engineer and Contractor.*

Neal Gravel Company Buys Carmichael Gravel Company's Plant

ANNOUNCEMENT has been received of the purchase by the Neal Gravel Co. of the plants of the Carmichael Gravel Co. located at Attica and Wolcottville, Ind.

W. P. Carmichael will retire from the sand and gravel business, as told elsewhere in this issue of ROCK PRODUCTS. E. Guy Sutton and F. P. Steinberg, formerly connected with the Carmichael Gravel Co., will be associated with the Neal Gravel Co.

The Neal Gravel Co. now operates seven plants with combined capacities in excess of 1,000,000 tons a year. Their plants are located in Indiana along the Wabash valley and include some of the largest and best gravel deposits in that section of the country. Their plants are so situated that they are able to serve an extensive territory in both Illinois and Indiana, the sites being as follows:

Attica, Ind. (two plants), Wabash railroad; Covington, Ind., Big Four railroad; Silverwood, Ind., Clover Leaf railroad; Summit Grove, Ind., C. & E. I. railroad; Wolcottville, Ind., Wabash railroad; Palestine, Ill., Illinois Central railroad.

The office of the Carmichael Gravel Co. at Danville, Ill., has been discontinued and the business will be handled through the central office of the Neal Gravel Co., Mattoon, Ill.

British Cement Prospects

CEMENT shares are moving at the present time for more than one reason. Not only is the industry likely to benefit from the big road-making schemes of the government, but with the reparations question settled the export trade may be in a more settled condition.

Associated Portland Cement Ordinary rose to 16s. 9d. recently, a price which compares with 13s. earlier in the present year. Although no dividend was forthcoming on the ordinary shares for 1923, owing to the depressed condition of trade, the recent changes on the board are likely to mean altered methods of business.

As a lock-up Associated Cement Ordinary looks cheap. Whereas the profit for 1923 was £125,698, the sum netted in 1922 was £239,719, while £418,441 was earned in 1920. Any trade revival should have a marked effect on the cement industry.—*Quarry Managers' Journal.*

How Damp Sand "Bulks"

AN excellent illustration of how damp sand "bulks," or refuses to pack to the same number of pounds per cubic yard as dry sand, is furnished by the experience of the Pioneer Sand and Gravel Co. of Seattle in furnishing sand for the Pacific Coast highway in Washington, as told in the *Highway Engineer and Contractor*. It will be noted that the damp sand was so packed by the jarring received in the railroad journey that a cubic yard weighed 110% of the original weight. This accounted for a loss in volume of 9½%.

"The Pioneer Sand and Gravel Co., which undertook to supply 105,000 yd. of sand and gravel at an average price of $2.17 per cubic yard, had an average haul of 82 miles by rail, and a freight charge of 4.7 cents per 100 lb. The company delivered an average of 30 cars per day, each car holding about 36 cu. yd. of gravel and 38 cu. yd. of sand. The sand weighed 2863 lb. per cubic yard at the loading point and weighed 3138 lb. per cubic yard at the places of delivery, there having been a settlement of 9½% in depth."

The moral would seem to be that sand should be sold by weight.

Additions to Big Tejunga Rock and Gravel Plant

WITH an hourly capacity of approximately 160 cu. yd. of crushed rock and gravel of various sizes, the plant of the Big Tejunga Rock and Gravel Co., members of the Los Angeles Builders' Exchange, is now in operation, it is announced by Lloyd J. Killian, general manager of the company. The firm has just completed an expansion program costing approximately $90,000 at the plant, which is located on North Cahuenga avenue. The entire plant represents an investment of $250,000, according to Mr. Killian.

The expansion program just completed included the addition of a complete crushing and weighing unit with the most modern equipment, a new well and a new engine. Although the concern holds a lease on 90 acres of land in the vicinity of the plant, only a portion of the property is being worked at the present time. —*Los Angeles Commercial News.*

[A description of the Big Tejunga plant was published in the April 19 issue of ROCK PRODUCTS.—Ed.]

Moulding Sand Deposit in Ohio To Be Developed

ANNOUNCEMENT has just been made of the closing of a deal by the Founders Sand and Supply Co. of Detroit with the Sherlock heirs for the sand rights on a 200-acre tract of fine moulding sand in New Lexington, Ohio, the purchase price being $40,000. They expect to spend $200,000 immediately in installing machinery for the crushing and marketing of the several grades of sand on the farm.

It is rumored Henry Ford will take the entire output the coming year.—*New Lexington (Ohio) Herald.*

Keystone Sand and Supply Company Launches New Dredge

THURSDAY, October 30, was a notable day in the history of the Keystone Sand and Supply Co., Pittsburgh, Penn., of which Alex. W. Dann, past-president of the National Sand and Gravel Association, is vice-president and general manager. Soon after noon on that day a new all-steel ladder dredge was launched at the plant of the Dravo Contracting Co., designers and builders, Neville Island, in the Ohio river. As guests of the company were many prominent gravel producers, contractors and engineers.

Fortunately for the visitors a new dredge No. 4 for the Ohio River Sand Co., Louisville, practically completed, was also on exhibition. These dredges will contain all the latest in sand and gravel dredge design and each will represent an investment of more than $300,000. We will describe them in an early issue.

The Keystone Sand and Supply Co. was unfortunate enough to lose one of its older dredges only about 36 hours before the new one was launched. It was sunk in the Ohio river by the overturning of a dump scow alongside.

St. Louis Lime Company Loses Payroll

NOT long ago we noted the holdup of a lime plant office in Chicago. It seems lime companies in St. Louis, Mo., run similar risks, according to a news dispatch dated St. Louis, October 12, which reads as follows:

"Two bandits held up Thomas J. Roche, branch manager of the Hunkins-Willis Lime and Cement Co., as Mr. Roche was making up the payroll in one of the company's yard offices here today and escaped with $400.

"Roche was threatened by one of the bandits who held a revolver at his head and told him to remain seated and keep quiet. The second bandit threatened Hiram Hensley, a clerk, also in the office at the time.

Nebraska Rates on Aggregates

THE Nebraska state railway commission sat all day recently on an inquiry into the question of whether it should order joint rates put in by the railroads on shipments within the state of sand, gravel and crushed stone. The railroads protest on the grounds that as there are sand pits on all railroads, no demand exists for joint hauls.

Stone dealers from Schuyler, Central City and Superior favored joint rates. They said that the railroads are playing favorites in that they have created a zone that gives all sand pits within 50 miles of Omaha and Lincoln, the chief consuming centers, a rate so low that none on the outside can compete without sacrificing all of their profits.—*Sioux City (Iowa) Tribune.*

Editorial Comment

European Sand and Gravel

The editor of that interesting little house organ, the *Sauerman News*, in the current issue, writes of the European plants he visited this summer. As compared with American operations they are small. An illuminating paragraph says that a large firm of Belgian contractors required 400 yd. per day of clean sand and gravel, and to obtain so large a quantity at a reasonable price found it necessary to build a plant to produce it. Of course 400 yd. a day is a nice little order that any plant would be glad to get, if it extended over any length of time. But there are many producers in this country that would receive and fill it without anyone getting excited over it. It is, for example, only 4% of the production of a plant recently described in ROCK PRODUCTS.

Rock Dust for Blasting in Coal

Rock dusting in coal mines—hardly heard of in this country a year ago—is now becoming a recognized practice and the rock dust and methods of applying it are becoming standardized. A use for rock dust which would seem to have immediate application is that of "stemming" or tamping the holes used for blasting in coal. The rock dust is shot out by the blast into the room where it mixes with any coal dust floating in the air and greatly reduces the liability of explosion. Experiments tried against the method of air cushioning a shot showed one method to produce as much lump coal as the other. For stemming holes the rock dust should be very finely ground; at least 50% should pass a 200 mesh screen. In experimental tests cement has been used because it was easier to obtain than rock dust of sufficient fineness, but if a demand for fine dust for such a use were to be developed the dust could be quickly supplied by a number of producers.

Uniform Concrete

The need of the work of the Portland Cement Association and others in educating the public in scientific concrete design is well enough shown in the results of some tests on cores from concrete pavements in various parts of the country. It is stated that the range of strength ran from 37% to 174% of the average, all the cores being five months old at the time of the test. Such variation ought to be impossible and it will be in the near future, for the building of highways is in general in the hands of engineers who are quick to understand and appreciate whatever applies to the work. For example the work of the Bureau of Public Roads on the "bulking" of damp sands has been taken up by the highway engineers of some states who are insisting that the sand which goes into the concrete shall be on a basis of weight instead of volume, or if bought by volume a correction must be applied for this "bulking." This one factor of "bulking" alone might account for a considerable lack of uniformity in concrete. And another, especially in highway construction, might be the use of dirty sand or other unfit aggregate. Highway engineers have admitted that in times past they were forced to use material that would not pass inspection, because there was no other available at a price that would permit a highway to be built at all. But this is a matter that is fast being attended to by the increase in plants and better transportation.

Wages in Building Trades

The investment bankers' meeting in Cleveland indorsed the opinion of "some economists" that the trend of wages in the building trades was downward and that the peak of building costs had passed and a steady decline will ensue in the coming decade. Wm. J. Moore of the Provident American Bond and Mortgage Co., who should be in a position to judge, gives his opinion that there is no possibility of a reduction of wages until the labor supply has increased from 30 to 50%, which certainly will not take place for a good many years without a radical change in our immigration laws. So economists, like doctors, may disagree. But the men actually employed in the building trades seem very cheerful and not at all worried over a drop in wages which may take place in the future.

Scrapping Our Railroads

H. G. Wells, in a recent magazine article, says that in another 50 years the development of highway transportation will have proceeded so far that we may begin scrapping our railroads. He is probably thinking of conditions in the "tight little island" in which he lives, where the distances are short and the loading and unloading of freight are a large part of transportation costs. But regardless of the value of his prophecy his opinion is of value as showing the tremendous importance of good roads in the development of our modern civilization. It is beginning to be realized that these roads mark quite as distinct a stage in progress as did the railroads. There is no need to feel, as some do, that the building of good highways will shortly be finished. Every one that is built opens and develops new territory and eventually this territory will call for more good roads to connect with main highways. Regardless of the efforts from some quarters to check the progress of highway programs, there is no fear that their end is near or even in sight.

Work of the U. S. Bureau of Mines in the Non-Metallics

Notes on Investigations and Reports Now Under Way

WE referred briefly to some of the interesting and valuable work being done at the New Brunswick, N. J., Experiment Station of the U. S. Bureau of Mines, under the direction of Dr. Oliver Bowles, in ROCK PRODUCTS of October 18. There has recently come to hand an official summary of some of this work as follows:

Preparation of Garnet

A field study of the gravity separation of garnet from its associated minerals has been begun by Interior Department specialists at a new mill at North Creek, N. Y. This work is being conducted co-operatively by the Rolla, Mo., and New Brunswick, N. J., experiment stations of the Bureau of Mines. Screen tests and tests of specific gravities and percentages of separation have been made.

Anhydrite Studies

Experimental work on the use of anhydrite as a cement retarder has been undertaken by the Interior Department. Requests for 25-pound samples of cement clinker have been sent to about 20 cement plants in various parts of the country by the New Brunswick, N. J., experiment station of the Bureau of Mines, where the experimental work is being conducted. It is considered that a method of rehydrating anhydrite profitably would be of great advantage in brass foundry practice as the hot metal dehydrates plaster of paris molds, making them useless for further employment.

Dolomite for Refractories

The dolomite refractories investigation being conducted by the Department of the Interior at the Ceramic Experiment Station of the Bureau of Mines, Columbus, Ohio, includes a study of the many fluxes which could be used to aid in the dead-burning of dolomite and also a complete survey of the iron oxide-alumina-silica field as fluxes. The temperature of calcination and the resulting properties have been carefully investigated, and the most desirable calcines chosen for further investigation in the making of dolomite bricks. Many binders and the several methods in common use of fabricating bricks commercially have been tried, and a thorough study has been made of the properties of the most successful ware.

The results of the work of the Bureau of Mines investigators indicate that by employing the proper fluxes in the proper proportions, it is possible to dead-burn dolomite when properly sized and under proper heat treatment, to a grain that will not slake after long exposure to the air nor under the more severe auto-clave treatment. Several binders for the ground grains have been found to give promise while two of this number are especially satisfactory. It is possible to make shapes from ground sinter, by both the semi-dry press and slop mold methods, which, when properly fired, will not slake upon prolonged exposure to the weather. The bricks thus made have physical properties which indicate that they will probably give good service as a basic refractory.

Details of these investigations looking toward the utilization of dolomite for refractories are given in Serial 2627 by G. A. Bole, copies of which may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

Materials for Rock Dusting Coal Mines

A survey of the sources of limestone, gypsum and anhydrite contiguous to coal mining districts has been completed by mineral technologists of the Interior Department on the staff of the Bureau of Mines. This survey was undertaken at the request of coal mine operators, in order that they may know where to obtain suitable materials for rock dusting coal mines to prevent explosions from coal dust. This survey is part of the vigorous campaign being carried on by the bureau to encourage the use of rock dust in all coal mines having an explosion hazard. Excellent progress is being made in this campaign; coal mine operators all over the country are manifesting great interest and taking steps to rock dust their mines. A report, which furnishes complete information on the available deposits of limestone, gypsum and anhydrite, the location of quarries, and facilities for shipment, will be published as a bulletin of the Bureau of Mines.

Filter Sand

The use of sand for the filtration of municipal water supplies is of comparatively recent use in this country, although at the present time, most cities of any size that draw their water supply from surface sources use sand filters in their purification system, states W. M. Weigel, mineral technologist, Department of the Interior, in Serial 2622, just issued by the Bureau of Mines. Not only are sand filters employed to remove sediment and suspend matter, but they also take out most of the bacteria in the water.

The general requirements for filter sand are more exacting than for any of the different kinds of sands, except the chemical specifications for glass sand. Filter sand must be uniform in size and within certain limiting sizes. In addition, it must be clean and free from clay and organic matter and of fairly high purity. Early investigations established the fact that an excess of fine material increased the friction and decreased the rate of flow through the filter; that the size of the finer particles rather than the coarser, determined the effective size; and also that large grains tended to cause irregularities in flow in different parts of the bed. There is no requirement as to grain shapes, except that they be not flat or elongated, since, so far as known, either rounded or angular grains are equally efficient.

A good filter sand requires a rather high silica content. It is generally specified that not more than 2% shall be soluble in hot dilute hydrochloric acid. Other specifications state that the combined lime and magnesia calculated as carbonates shall not exceed 2%. Aside from this, the chemical composition is usually not specified.

Production of Filter Sand Requires Careful Preparation

Compared with building sand, the production of filter sand is small and requires more careful preparation and extensive plant. A much better price is obtained than for the ordinary grades of sand, and in consequence the points of production are more widely scattered and the sand is sometimes shipped long distances.

The chief producers are in New Jersey, North Carolina, Illinois, Minnesota and Missouri, but any good sand bed can produce suitable filter sand, if it can be washed clean and contains enough grains of the required size to warrant their separation from the rest of the sand. Where the coarser grades of sand-blast sand are produced, the finer material is often prepared for filter sand. Also, the finer grades of sand-blast sand may be used for filter sand if prepared with proper uniformity.

Filter sand may be prepared from ocean beaches, lake deposits, river bars, sand banks and soft sandstone, and the method of excavation depends largely on the nature of the deposit.

Copies of Serial 2622 may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

Ruins of Columbia Quarry Company's Plant

THE accompanying picture shows the ruins of the Columbia Quarry Co.'s plant at Krause, Ill., which was burned last September. The cause of the fire was that the high tension wire to the transformer house was struck by lightning and the flash ignited the 150 gal. of oil contained in the transformer. The flames from the transformer house leaped through an open window and set fire to the crusher house and the entire plant was burned in spite of the efforts of the company's own fire fighters and the Columbia fire department.

The completeness with which the fire did its work is evidenced by the photograph. Although the primary and secondary crushers still stand firmly enough on their foundations the remainder of the plant is a tangle of pulleys, screens and piping reduced to debris.

As stated in the Oct. 4 issue of ROCK PRODUCTS plans are made for a new plant that will be built at once. This plant will have a capacity of 400 tons per hour and will embody the latest ideas in crushing plant design. The design is by the Allis-Chalmers Co.'s engineering staff, working in connection with the engineers of the Columbia Quarry Co. and a large number of plants were visited in seeking ideas for design and construction. It is believed that this will be one of the best plants of its size in the country.

The plant will be all-steel construction, concrete being used for the foundations of the building and machinery.

Illinois Uses a Half Million Tons Agstone Yearly

APPROXIMATELY 500,000 tons of limestone were used to sweeten agricultural lands of the state in 1923, as against 32,000 tons in 1911, according to F. W. Galt, of the agronomy department of the University of Illinois. He estimated that 2,500,000 tons have been applied to the soil of the state since 1911, and 1,500,000 tons in the last five years.

"As a result of the increased use of this material," he said, "commercial organizations of the state, which furnish it with limestone, have increased their output, until in 1920 they produced 31%, or almost one-third of the agricultural limestone produced in the entire United States." — *Belleville (Ill.) News-Democrat.*

Agstone Needed in Illinois

THE need of limestone in the soil of DeKalb county is widespread, and the fact is being impressed on the land owners just now by the DeKalb County, Illinois, Soil Improvement Association. Thomas H. Roberts says in the *DeKalb County Farmer:*

Seventy-five per cent of the soils of DeKalb county show an acid reaction on a soil test, some to a slight degree, others to a marked degree. Your own farm should be the most convincing evidence of the value of limestone whether you need it or not. Clover, alfalfa and sweet clover fields all over DeKalb county show a much heavier growth in the low land than on the hills.

It is true that the soil is probably more fertile, but our soil tests generally show that the ravines and low ground is sweet, while the higher ground gives an acid reaction, and that stands of these legumes vary in density as the degree of acidity in the soil.

Limestone can be obtained at this time on a basis of 50 cents per ton at the quarry for Farm Bureau members and 80 cents a ton at the quarry for non-members. If there is any reduction in price you will receive full benefit on same.—*Somonauk (Ill.) Reveille.*

An interesting view of what remained after the fire that destroyed the plant of the Columbia Quarry Co. at Krause, Ill. The crushers are still standing but the ground is covered with the screens, pulleys, motors and elevator buckets that fell

W. P. Carmichael Retires From the Gravel Business

THE news that W. P. Carmichael has retired from active participation in the production of sand and gravel will be received with regret by other producers, especially those who attended the conventions of the National Sand and Gravel Association and the Indiana Sand and Gravel Association, of both of which he has long been an active member. What Mr. Carmichael said on those occasions was always worth listening to and no man is held in higher esteem by his fellow producers. It is to be hoped that he may continue these connections, even though he is no longer actively engaged in production.

In his answer to a letter from ROCK PRODUCTS, confirming the report of his retirement, Mr. Carmichael says in part:

"The facts are that I have disposed of my plants at Wolcottville, Ind., and Attica, Ind., and the real estate connected with them, to the Neal Gravel Co., of Mattoon, Ill., which will operate them in connection with five plants which it is already operating one each at Attica, Covington, Silverwood and Clinton, Ind.., and Palestine, Ill. These are all Wabash valley plants, shipping into the Illinois and western Indiana territory with the exception of the Wolcottville plant, which is located in northern Indiana, 135 miles east of Chicago.

"The Attica plant of the Carmichael Gravel Co. was established by myself in 1903, being at that time an adjunct to the construction work which my associates and I have carried on for about 30 years. At the time this plant was established there was very little commercial demand for sand and gravel, but there has never been a year since that time, with the possible exception of the years 1917 and 1918, when the demands upon the plant have not been up to and even beyond its capacity.

"The Attica plant now has an easy capacity of 2,000 tons daily and has frequently shipped as much as 3,000 tons in one day's loading. The Wolcottville plant has a capacity of about 25 cars, or 1300 tons daily. Both these plants were developed for meeting the peculiar production problems obtaining at the local deposits, and were well adapted for that purpose.

"While I am happy in being relieved of the operating responsibility in connection with my plants, yet I retire from the gravel business with many regrets. The problems have always been interesting, and while many times the difficulties seemed almost unsurmountable, they never were quite so, and the joy in achieving success with any problem fully compensated for the difficulties encountered in doing so.

"I have many pleasant acquaintances in the sand and gravel business, and I may have an opportunity of meeting them at various times, for although I will not be actively engaged in the operation of the plants, I still have considerable financial interest in them and will rejoice not only in the prosperity of the Neal Gravel Co., but the industry at large.

"Since my connection with the National Sand and Gravel Association, the sand and gravel industry has grown from a few scattered unorganized plants to an industry that is comparable with any of the other industries producing basic materials for construction. As those engaged in the industry become more experienced, and the methods and problems connected with it are handled more rationally than they have been at times, it will come to be regarded by the public as one of the great industries of the nation."

W. P. Carmichael

New Merger of Sand Producers Formed in New York

EFFORTS to stabilize sand, gravel, grit and crushed stone prices and to provide adequate supply of these basic commodities in New York City have culminated in a million dollar merger between two of the largest distributers, says Allen E. Beals in the current Dow Service Daily Building Reports.

The Manhattan Sand Co., with its principal retail yard at Sixty-second Street and the East River, and the Colonial Sand and Stone Co., with its principal retail plant at Fifty-second Street and the North River, have formed what its officers declare to be the largest single retail and gravel firm in the United States, if not in the world. It handles 5 per cent of all the building sand used in the United States, or more than one-half of the sand used in New York City, and is today the largest single consumer of sand and gravel in the world. It is equipped to deliver 5,000 cu. yd. or approximately 6,250 short tons, of sand a day.

The direct benefit of such a merger to the individual builder is that if his job is in Manhattan or the Bronx he will be able to get quicker deliveries than heretofore.

Ten years ago Generosco Pope was a yard foreman in the employ of the Manhattan Sand Co., of which he is now president, and Lawrence Rukeyser, now president of the Colonial Sand and Stone Company, co-purchaser with Mr. Pope in the combine, was salesmanager for a portland cement company.

In 1918, when the Colonial Sand and Stone Co. became a factor in the New York sand and crushed stone market, a movement of 300 cu. yd. was considered a big day's business. Under the combination of equipment and resources provided under the purchase plan these two men will daily control approximately 5 per cent of all the sand sold in the United States. New York City is now using approximately 11,500 tons a day of sand, including the bank sand consumed locally by the Boroughs of Brooklyn, Queens and Richmond. This total, in the absence of great unit construction projects like subways, etc., is a fair reflection of the volume of building construction at present. It exceeds all previous New York volume records. —*New York Times.*

New Texas Gravel Company

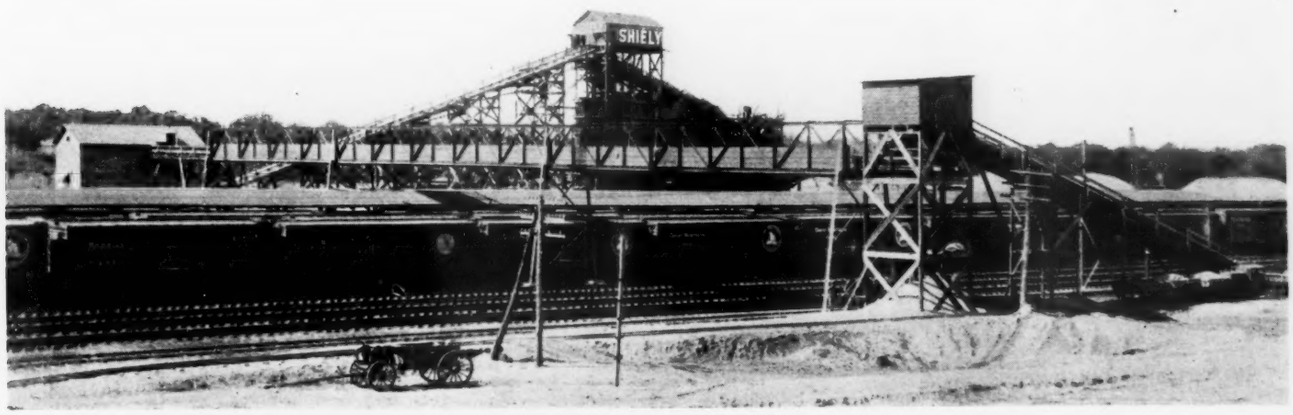
RECENTLY a contract was signed up between M. E. Maney and C. W. Shearer and David M. Duller of Houston, Texas, by which the gravel industry at this point rises to greater prominence among our industries than it has occupied heretofore.

The new partnership is installing a caterpillar motor driven shovel on the banks of the Colorado river which will enable it to load from twenty to thirty cars of gravel per day. They have secured the contracts for furnishing most of the gravel on the highways in this section of the state and with their loading facilities will be in position to take care of the business which has been established. In addition to the motor shovel, a gravel washing plant is being built to produce gravel for other purposes than road building.

Nelson M. Duller of Houston arrived in the city a few days ago and is in charge of the installation of the shovel and erection of the washing plant. He will look after the affairs of the company at this end of the line. Within a short time the partnership will incorporate as a company under the name of Smithville Gravel and Sand Co.—*Smithville (Texas) Times.*

How J. L. Shiley Has Extended the Life of His Plant

J. L. SHILEY, of the J. L. Shiley Co., St. Paul, Minn., has operated a sand and gravel plant on Snelling avenue, St. Paul, for a number of years. When the deposit approached exhaustion he was confronted with the alternative of abandoning the situation altogether or moving his plant to the other side of the railroad on which there was still an abundance of sand and gravel to be found.



The new conveyor system which carries the bank material over 15 tracks to the washing plant

Either of these courses would prove expensive and it was desired to avoid moving if possible on account of the many advantages of staying in business at the same location.

The problem was finally solved without having to accept either of the alternatives which had at first presented themselves. The plant stays where it is—in its original location. The sand and gravel which is washed and screened in the plant is dug from the deposit on the other side of the track and conveyed to the plant by a system of conveyor belts.

What makes this system remarkable is the fact that the conveyor has to pass over 15 tracks to connect the plant and the deposit. This meant that the conveyor had to be carried on a long bridge which could only be supported at certain places. The distance which the material has to be conveyed from the deposit to the plant is approximately 400 ft.

The installation was designed by C. S. Hemtington, engineer of the Link Belt Co., of Chicago, and Link Belt machinery was used throughout, including the horizontal and inclined conveyor and the feeder, as well as the drives, was used throughout.

The advantages of this installation are that it greatly prolongs the life of the plant with a much smaller investment than would have been required to move the plant and also that the changes could be carried out without interrupting the regular plant operation to any serious extent.

Enlarge Iowa Gravel Operation

THE gravel pit at Sand Prairie, Iowa, just north of Bellevue, will be re-opened on a bigger scale than ever before. The Schneider Sand and Gravel Co. of Clinton has had its representatives on the ground and already much of the machinery is there.

Three concrete bins, 18x32 ft., and capable of holding 40 tons of gravel will be constructed. It is expected that this new industry will furnish employment to several men here.—*Cedar Rapids (Iowa) Gazette.*

New Sand Plant at Cape Girardeau, Mo.

PRELIMINARY work has begun on the new plant of the Cape Sand Co.. The plant is to be located on the North Main street lot formerly occupied by the Matteson Sand mill.

The lot has an area of 115 feet on North street by 145 feet on Main, and a direct switch to the main line tracks of the Frisco road gives railroad connection.

According to Lester Deimund, assistant manager, plans are now being made by a Chicago engineering firm and perhaps the outstanding feature of them is the manner in which the sand will be brought to the screening plant from the river.

A barge is to be moored just off shore and will be equipped with a crane dipper. This dipper will unload sand and gravel from the sandboat, placing the material in a hopper placed on the river bank.

Connecting with the hopper an endless belt conveyor will carry the sand through a tunnel under the railroad tracks, up to another conveyor, which will take the material to the screening machinery.

All of the screening, which is now done on the sandboat, is to be accomplished in the plant and the construction will be of steel, with all foundations of concrete.

A bin for unloading the sand into wagons and trucks will be erected and is to have a capacity of 500 tons. Storage facilities for 15,000 to 20,000 tons of sand and gravel will also be constructed. About 5000 tons is the storage capacity at the present plant.

Mr. Deimund plans to have the new plant in operation before the high water next spring in order to have a reserve supply of sand to meet the shortage which invariably occurs during the period when the river is up.

The old plant now in use has been outgrown, Deimund said, and will be scrapped. The large stone crib upon which the loading derrick is now placed will be blasted away with dynamite.—*Cape Girardeau Missourian.*

National Sand and Gravel Convention

THE ANNUAL CONVENTION OF THE NATIONAL SAND AND GRAVEL ASSOCIATION will be held at the Auditorium Hotel in Chicago, January 5, 6, and 7, 1925.

This is the week of the Good Roads Show in Chicago and members and visitors will have an unusual opportunity to see machines used in their industry and have them explained by engineers who are in charge of exhibits. The convention will adjourn in the afternoon of each day so that members may do this without missing any of the convention program.

As Chicago hotels will be filled up that week reservations should be MADE EARLY.

Reduction of Alabama Gravel Rate

REDUCTION of approximately 20% in the freight rate on sand and gravel, from Montgomery to Dolcito Junction in the Birmingham district, was approved by the Alabama Public Service Commission, on application of the L. and N. Railroad Co. The new rate is to be 79 cents a ton between the two points named.—*Montgomery Advertiser.*

Dallas Now Produces 10,000 Barrels of Portland Cement Every Day

MORE than 10,000 bbl. of portland cement, with a market value of about $25,000, is the daily contribution of the portland cement industry to the manufacturing business of Dallas. The bulk of this production is required in carrying on building construction in Dallas and in other towns and cities of Texas. In the manufacture of this material Dallas leads the southwest with plants relatively small initially now expanded to a tremendous capacity.

The first cement plant to be located in this section was that of what is known as the Texas Portland Cement Company. This company was first organized under its present corporate name in March, 1900, and thereafter built a 500-bbl. plant on the site of its present establishment, some five miles west of the Commerce street viaduct. The first of the output of this plant was shipped late in 1900. The company passed through several corporate reorganizations, with the retention of its existing name under a charter issued in 1914. Its production of cement has steadily increased with the output now grown from 500 bbls. a day to 6,500 bbls. The necessity of additional production was solved by the location of another plant in south Texas.

The success of this company and the presence of large quantities of raw material brought later another and similar development in the plant of the Trinity Portland Cement Company, organized in 1907. This company has an output of 4,500 bbl. of cement a day. Both of the plants are operated virtually to capacity with a constantly growing demand, and both have been forced to plan expansion in other localities. Market for the combined output of these plants is chiefly in Texas, though Arkansas and Louisiana take large quantities of Texas cement from them.—*Dallas News.*

Progress on Virginia Portland Cement Corporation's New Plant

WORK of clearing the site of the old Giant Cement factory in South Norfolk, Va., for the new plant of the Virginia Portland Cement Corp. is progressing rapidly. It will be ready for construction of buildings when the plans of the latter concern are complete.

Plans are being prepared for one of the most modern cement plants in the world, and with various auxiliary facilities will represent an outlay of around $1,500,000. In order to take advantage of all new ideas in the manufacture of cement, the corporation is taking more time with its plans than had been anticipated, but it will be ready in the near future to announce its definite program.

The plant will have an annual capacity of a million barrels of cement, and the location of the factory here is expected to accelerate the use of cement locally and prove a stimulus for building as a result of the saving in freight charges. Actual manufacture of cement will begin early next summer and around 200 men will be employed, at least half of whom will be skilled mechanics.

Contract for the first structure of the Virginia Portland office building will probably be let within the next week.

E. Posselt, vice president of the International Cement Corporation of which Virginia Portland is a subsidiary, is making his headquarters in Norfolk, pending the formation of a permanent organization to operate the new plant.—*Roanoke (Va.) Times.*

Not a Mile Long Conveyor But a Tramway

IN THE October 4 number on page 69 an item was published regarding a mile long conveyor being installed at the plant of the Superior Portland Cement Co. We have received a letter from the company in regard to the item, as follows:

"Unfortunately, the *Journal of Commerce*, from which your story was taken, got the article pretty well mixed up. The true facts are that we are putting in an aerial tramway from our quarry to our factory, a distance of 6,300 feet. The contract, which was awarded to Hendrickson-Alstrom Construction Co., of Seattle, covers the erection of the rock conveyor building and storage bin in the upper terminal of the tramline. This is a reinforced concrete structure, costing about $15,000.

"The contract for the tramline, buckets, etc., has been awarded to the United States Steel Products Co.

"We will shortly call for bids on the erection of the tram towers and the lower terminal structures."

Missouri Portland Cement Co. Buys Ground for Expansion

THE Missouri Portland Cement Co. has purchased six acres on Natural Bridge road and the Terminal Railway tracks in St. Louis, to be held in reserve for expansion purposes. Meantime the ground will be occupied by the company as yards.

The tract has a frontage of 442 feet on the south side of Natural Bridge road by a depth of 520 feet, and a frontage on the Terminal Railway of 325 feet.

The main plant of the company, one of the foremost concerns of its kind in the country, is at Prospect on the river front, just north of the city limits. The business of the company is exceeding all previous records, reflected in the run up in the price of the company's stock, which was quoted yesterday at 141, being up more than 40 points as compared with its levels of a year ago.—*St. Louis Post-Dispatch.*

South Dakota State Cement Plant Being Tested

NUMEROUS rumors have been going the rounds of Rapid City, S. D., to the effect that the state cement plant has begun operation.

Inquiry at the plant reveals that this rumor started through the setting into motion of certain portions of the machinery as a "testing out" process. Limestone is being taken from the quarry, put through the crusher and stored in the raw materials building preparatory to the time when the manufacture of cement begins.

Due to unfavorable delays in arrival of equipment, necessary for complete operation, the formal opening of the plant has been delayed. It is not expected to take place until November.—*Lead (S. D.) Ball.*

National Cement Co.'s New Plant at Montreal

THE National Cement Co. is erecting a new plant in Montreal East, Quebec, Canada. This plant is designed to produce, when completed, 3,600 bbl. of cement per day. It is being erected under the direction of Richard K. Meade of Baltimore, and the plans were approved by M. E. C. Champion, engineer of the International Cement Co., New York. It is stated that the limestone is similar to the cement rock of the Lehigh district of Pennsylvania and that there is enough limestone rock to last the plant at least 90 years. A large part of the concrete work, including silos, tanks and machine foundations, has already been constructed.

Wabash Portland Cement Company's New Plant

PLANS for the new plant of the Wabash Portland Cement Co., at Osborne, Ohio, are reported to be nearly complete and bids for erection will probably be asked for in the next two weeks. The local office of the company has been established at Osborne. The main office of the company is in the Ford Building, Detroit.

Correction on Cement Price Quotation

THE mill price for portland cement from Universal, Penn., on page 59 of the October 18 number, was given as 58¾ cents per bag, which is an error; it should have read, 48¾ cents.

German Cement in Brazil

THE Department of Commerce in its current bulletin of business conditions abroad notes that the demand for cement in Brazil is good but that the price of German cement has fallen about 4% and it is now quoted at 8s 7d.

Cement Products

TRADE MARK APPLIED FOR WITH U.S. PATENT OFFICE

An Undeveloped Market for Fine Aggregate Materials

Prepared Portland Cement Stucco Offers a Big Field to the Ambitious Aggregate Producer

By A. J. R. Curtis
Manager Cement Products Bureau, Portland Cement Association

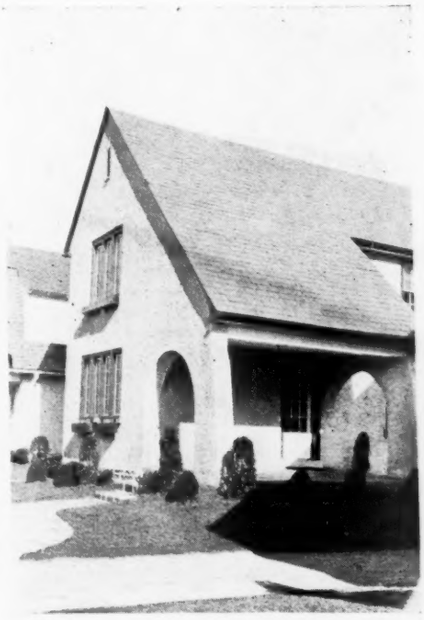
THE universal appeal of stucco surfaces for dwellings and other small and moderate sized buildings can scarcely be denied. Some of the earliest habitations of the race, of mud and stones, were often covered with a mud daubing to which modern portland cement stucco may trace its ancestry. Surfaces of adobe houses in the southwest occasionally show a certain refinement of technique and serve as a connecting link between the plastered finishes of ancient periods and the beautiful cement stucco effects of recent years.

Variety of texture and color treatment, almost without limit, avoid monotony, sustain interest and give every stuccoed surface a certain individuality, for no two jobs are ever alike. As individuality and appropriateness of apparel please and are naturally recognized as indications of personal refinement, the same qualities applied to the walls of a dwelling not only enrich and elevate a community, but indicate the owner's characteristics of good taste and mental poise.

Portland cement stucco offers a range of textures varying with the shape, size, gradation and proportioning of various quarried stones, gravel, slag and cinders, while the color range is very broad, depending on the available variety of mineral pigments and colored aggregates and the use of gray or white portland cement, or a mixture of the two. No other surfacing method gives opportunity for such range of artistic hand treatment.

Stucco materials in use at the present time are of two general kinds, portland cement stuccos and magnesite stuccos. The portland cement stuccos have many advantages such as great structural strength and a much wider range of application methods than magnesite. In addition, cement stucco has behind it a long record of experience which has made possible the formulation of exact specifications by which absolutely dependable stucco work can be produced. Most architects specify portland cement stucco.

Magnesite stucco materials, usually without specifications to guide the user, and with but a short record in actual service, have recently come to the fore and are now enjoying a wide use. How permanent they will be nobody knows. They lack almost entirely desirable possibilities for individual treatment, being restricted to a few flat surface effects. But magnesite has become decidedly popular with small house builders because it is put up in convenient bags, mixed ready for use, and very thin coats, from a quarter of an inch to a half inch are all that are being used. Ready mixed magnesite material is a more expensive product for the builder, but, of course, he expects to pass along this difference in cost to the home owner. Building material dealers receive an attractive margin on magnesite sales which probably has been no small factor in developing builder interest.



A portland cement stucco texture designed to harmonize perfectly with artistic lines of this suburban home

Opportunity to Prepare and Market Cement Stucco

The field for portland cement stucco presents a great undeveloped market. Stucco is not only one of the most effective coverings for small and moderate sized buildings but it is one of the cheapest in first cost and most economical over a term of years. Thousands of old buildings can be reclaimed and made to yield good returns by stuccoing the exteriors at an expense not much greater than the cost of painting. Old masonry exteriors can be renovated and made to harmonize more perfectly wtih present surroundings. In a city like Chicago, for example, it should be possible to sell stucco for these incidental purposes, to the extent of 25,000 to 50,000 jobs per year.

The known fire-resistive qualities of portland cement stucco on metal lath is a selling point which has never been brought to the attention of the public with sufficient vigor, but with a proper advertising setting it could be well capitalized by the manufacturer of prepared portland cement stucco. Excellent examples of portland cement stucco work abound in all climates and for all classes of structures—including many of the largest and most attractive buildings.

Although excellent portland cement stucco

An attractive surface demonstrating one of the innumerable finishes possible with portland cement stucco

is now being prepared and marketed in a limited way by a few concerns, there is opportunity for others in this field, particularly as an adjunct to a general concrete aggregate or building materials business. For use at nearby points, material for the undercoats could be sold in sacks ready mixed, but in general it probably would be found more practicable to sack and market ready mixed only the fine surfacing coat. The undercoats are mixed on the job with no more effort or technique necessary than for mixing ordinary cement mortar.

Portland cement for stucco should meet the requirements of the standard specifications for portland cement of the American Society for Testing Materials. All standard brands of American cement are guaranteed to meet these requirements. Fine aggregate should consist of sand or screenings from crushed stone or crushed pebbles, free from dust, loam, vegetable and other foreign matter. It should be graded from fine to coarse and its largest particles should pass a No. 8 screen. This applies to fine aggregates for all coats.

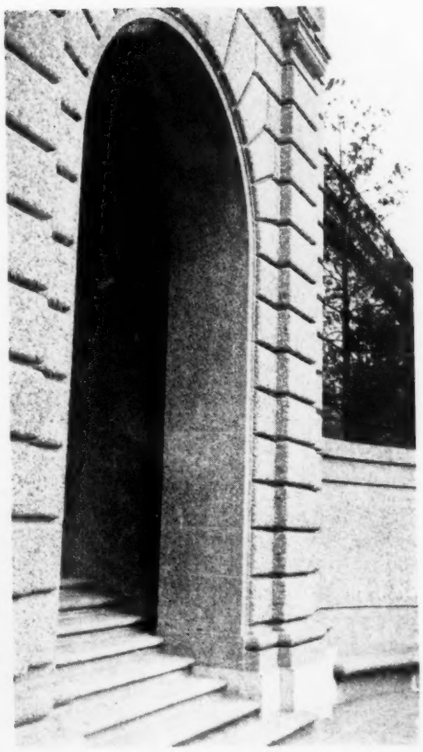
Hydrated lime should meet the requirements of the standard specifications for hydrated lime of the American Society for Testing Materials. When used it should be carefully measured and added to the sand and cement dry. The amount of hydrated lime in no case should be more than one-tenth the weight of, or one-fifth the volume of the portland cement.

Notice the rough texture of the cement stucco surfacing which surounds the doorway of this old Pennsylvania Dutch design

Permanent mineral colors only should be used in stucco mixtures. These colors should be fully guaranteed by their manufacturer to be unaffected by lime, cement, or weather. The amount of coloring used should not be more than 10% of the weight of the portland cement. The coloring matter and fine aggregate should be mixed together first and then the cement added. The mass should then be mixed dry until the entire pile is uniform in color.

Depth of the shade produced by mineral colors can be secured only by mixing the materials for a longer time than would be required in work in which color is not used. Magnesium fluosilicate has been used with apparent effectiveness in setting the color in the stucco.

The most common surface texture is that produced by throwing on the surface mixture with a small broom. Size and shape of the particles and amount of water used govern the texture which is obtained



An applied aggegate surface produced with a mixture containing Potomac river sands by John J. Farley, of Washington, D. C.

Pure red oxides of iron produce the most durable red tints. Venetian red should be avoided, as it tends to run and fade. Manganese oxide is probably the best material for black, although a high grade of carbon black or lampblack is generally satisfactory.

The entrance to the famous replica of Washington's headquarters at Valley Forge contrasts majestically with the distinctive textured portland cement stucco which surrounds it

COLORS FOR USE IN PORTLAND CEMENT STUCCO AND FACING MATERIAL FOR CONCRETE BLOCK

Color desired	Commercial names of colors for use in cement	Pounds of color required for each bag of cement to secure—Light shade	Medium shade
Grays, blue-black and black	Germantown lampblack*	½	1
	Carbon black	½	1
	Black oxide of manganese	1	2
Blue shade	Ultramarine blue	5	9
Brownish-red to dull brick red	Red oxide of iron	5	9
Bright red to vermilion	Mineral turkey red	5	9
Red sandstone to purplish red	Indian red	5	9
Brown to reddish-brown	Metallic brown (oxide)	5	9
Buff, colonial tint and yellow	Yellow ochre**	5	9
	Yellow oxide	....	....
	Chromium oxide	5	9
Greenshade	Greenish blue ultramarine	6	....

*Only first quality lampblack should be used. Carbon black is light and requires very thorough mixing. Black oxide or mineral black is probably most advantageous for general use. For black use 11 pounds of oxide for each bag of cement.
**Should contain not less than 15% of the oxide.

Sponged surface stucco on an attractive church in Evanston, Ill.

Common lamp black should not be used.

Hair or fibre may be disregarded or may be used in materials prepared for the scratch coat only when stucco is applied over wire lath that is to be back plastered or on metal or wire lath applied over sheathing and is separated therefrom by furring deeper than ⅜ in.

All coats should be mixed in the proportion of one part by volume of portland cement to three parts of fine aggregate. A sack of portland cement is considered as 1 cu. ft. The exact proportions of materials must be uniformly maintained for each particular mixture.

Special Aggregates Commonly Used In Stucco Facings

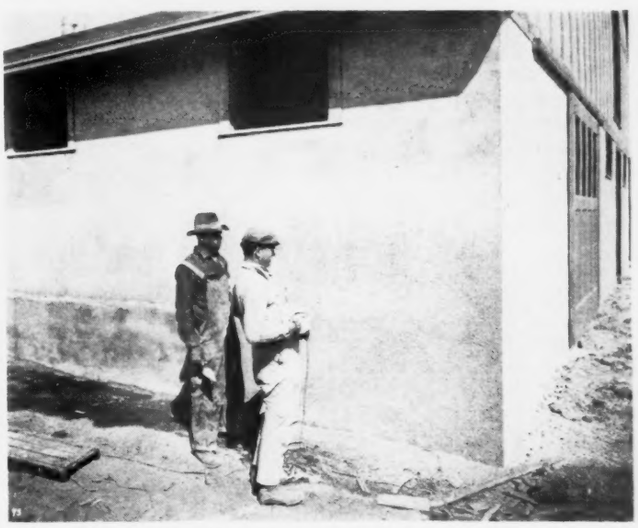
Marbles: White and colored marbles in sizes ranging up to ⅛ in.

Pebbles: Highly colored pebbles from the Potomac river and other regions are crushed to sizes up to ⅛ in. or ¼ in. and used largely for their color value.

Sands: Certain colored sands have been employed to a limited extent where it was desired to combine their color values with sand texture effect. Most of these sands run too fine and too uniform to permit the use of more than a limited amount.

Granites: Certain granites have been used to some extent, but the marbles are much

Brush finish stucco showing method of accomplishment



Stucco machine for projecting dash coat on base

Example of a sponged surface stucco finish

"King Tut" stucco finish coat applied with trowel

to be preferred, because of higher sparkle and easier crushing.

Mica: Small amounts of mica flakes are often introduced to produce sparkle.

Micaspar: This material, the product of the Crown Point Spar Co., Crown Point, N. Y., is one of the most satisfactory and commonly used stucco aggregates. It is obtainable in a variety of prepared sizes.

Black copper slag: This material is quite commonly used in small quantities where a sprinkling of virile black particles is desired.

Carborundum: Carborundum is furnished in a variety of sizes and textures in black and peacock blue shades and mixtures.

Blast furnace slag: Only limited use has been made of common slag in certain special cases where the characteristic spongy surface effect was desired.

Methods of Marketing Cement Stucco

The manufacturer of portland cement stuccos will find several sales plans available. He may sack and distribute only the surface coat or he may handle both undercoating and surface coating mixtures. No doubt his market can be largely extended in some localities by adding a contracting department to apply the stucco, selling it on the wall, with a guarantee behind it. Possibly a better plan for some cities would be to maintain a service department to help contractors figure jobs, furnish skilled workmen and contract work where no contractor can be found to undertake it.

Stucco surfacing mixtures are equally well adapted to use for facings for concrete block, and for this purpose have a wide application. There are some 6000 block manufacturers in the United States and relatively few who now have available first-class facing mixtures.

Many building materials dealers have expressed a willingness to market a good portland cement stucco, and this is one of the fields for expansion which the wide awake stone or aggregate producer should not overlook.

Wet-Mixed Concrete as a Sand and Gravel Plant Side Line

A Commercial Suggestion in Small as Well as Large Cities

THE following information has been secured by us from reliable sources in answer to several requests from readers. The remarks jibe with our own observations of wet-concrete plants. We know of at least one or two such operations that are apparently so profitable that the owners take the point of view of "the less said about them the better."

Regarding the price of ready-mixed concrete we have found it a practice to charge the regular delivered price for the sand, gravel and cement plus a fair margin for the cost of mixing with a profit. In other words, there are four distinct factors in the profit as a whole—the profit on the sand, gravel, cement and the profit on the finished product.

The information referred to above and furnished us from outside sources is as follows:

"Two plants in small Illinois cities have been in successful operation for several years. One is located at Kankakee, Ill., and the other at Danville, Ill. The plant at Danville has been remodeled recently and enlarged. This plant now has two mixers of 1-cu. yd. capacity each mounted on a permanent reinforced concrete frame with overhead material bins. This enlargement and remodeling was done at a cost of approximately $35,000. The original plant certainly must have been profitable to have justified such an expenditure for alterations and enlargement.

"Last year a large central mixing plant for the sale of ready-mixed concrete was constructed in Los Angeles at 1000 LaBrea avenue by Stine & Ellis. This plant represents an investment of $25,000 and has a capacity of 365 cu. yd. of mixed concrete in eight hours. A nine-sack Smith tilting mixer is operated by electricity.

"Since the completion of this plant two others have been erected within a radius of 50 miles from the same design, and plans are being prepared for two more. They are prepared to deliver mixed concrete in quantities sufficient for any job from a post foundation to a 12-story building. The company reports a rushing business, notwithstanding quite a building depression in Los Angeles at the present time. The mixing is done entirely by formula as the operator does not see the mix.

"Two sizes of screened rock are carried and two sizes of crushed rock, and the firm has delivered concrete to as many as 32 separate jobs in one day with practically every different mix of concrete in common use.

"The company's product has been tested and approved by the Board of Public Works of the city of Los Angeles and, at the present time, is being used on streets of the city. The list of customers includes the Standard, Union, and Associated Oil companies; Peerless, Hollywood, and Community laundries; Lasky, Keaton, and Vitagraph studios; Gay Engineering Corporation, and the city of Beverly Hills. The mixed concrete has also been sold to local contractors, home builders, machinery dealers, plumbers, and to the county of Los Angeles for boulevard repair and construction.

"This plant operates 16 Reo dump trucks and 4 Fords mounted on pneumatic tires.

"The Smith Bros., Inc., of Dallas, Tex., operate a plant at Dallas which has a capacity of about 50 cu. yd. per hour. The plant has been in operation for more than a year and is apparently a financial success as the same firm has constructed a similar plant in Houston, Tex. Concrete has been furnished from this plant for the construction of county highway pavements, pavements for the city of Dallas and municipal storm sewers. A few curb and gutter contractors and some driveway contractors purchase all their concrete from this plant. They also furnish material for many building foundations.

"The Smith Bros., Inc., have depended largely on newspaper advertising and descriptive folders for the sale of their "SPECIFICATION" concrete. They keep one salesman occupied on full time at each plant to develop the sale of this pre-mixed concrete.

"Another plant is operated by the Fort Worth Sand and Gravel Co., at Fort Worth, Tex. This plant has a capacity of approximately 30 cu. yd. per hour. When a wetter concrete is required than this plant can handle, a small mixer mounted on a Ford chassis is sent to the job. Dry materials, properly proportioned, are delivered in Ford trucks and the concrete is mixed on the job. This firm operates two of these small mixers and plans to purchase others as needed.

"In the beginning any operator will no doubt encounter difficulties in the operation of such plants but they can all be overcome.

"Where the concrete has to be hauled for more than one-half to three-quarters of a mile it will be difficult or impossible to use as wet a mixture as is commonly used in reinforced construction on account of the segregation of water and fine materials from the mixer. It is also difficult to dump a wet mix out of the truck after it has been hauled for sometime and become thoroughly compacted into the bed of the truck.

"Most firms find that they can haul concrete considerably farther, without undue

segregation or compacting, on pneumatic tires than on solid tires. There is no question but what pneumatic tires cost considerably more per truck mile to operate than solid tires but they probably offer somewhat more protection to the mechanism of the truck from the jolts of the road than solid tires. The Illinois State Highway Department limits the time that concrete can be hauled after mixing and before it is deposited to 40 minutes. The Wisconsin State Highway Department allows an interval of 45 minutes before concrete is deposited. A recent series of investigations carried out by the U. S. Bureau of Public Roads indicates that the strength of concrete is not materially affected when it is hauled in trucks for as long as 3 hours and 20 minutes, although the consistency is, of course, very much changed in such a time. Similar tests carried out at Portland Cement Association laboratories bear out the conclusion of the Bureau of Public Roads so that there is little argument from the standpoint of injury to the concrete against hauling it any reasonable distance in trucks. There are instances on record where it has been hauled more than six miles and used successfully."

The Standardization of Concrete Masonry Units

Recommendations Made at the Chicago Meeting

IN the early part of 1923, the Division of Simplified Practice of the Department of Commerce at Washington, D. C., began to investigate the possibilities of reducing the number of sizes of the various concrete building units which are in common use throughout the country. The units considered were concrete building block, concrete building tile and concrete brick. The survey showed that many sizes were being used in various portions of the country and it was quickly recognized that great benefit would be derived by the concrete products industry if the number of shapes and sizes of these concrete units could be materially reduced. If this were done, the manufacturers of concrete masonry would have a standard of size to go by, producing plant operations would be simplified, architects could more easily design the structures using these units and builders could more definitely plan their work.

The Division of Simplified Practice at that time requested the co-operation of the American Concrete Institute, Portland Cement Association and Concrete Products Association (a national organization). Under the guidance of this division remarkable progress has been made and at a convention held in Chicago on October 16, 1924, standard sizes for concrete masonry units were adopted. These will go into effect in production on June 1, 1925, and will continue in effect for one year, at which time advisable changes or modifications may be made.

The various steps which lead to this final convention will be briefly outlined. During the summer of 1923 a sub-committee was appointed by the American Concrete Institute of Committee P-1, which deals with concrete building units. This sub-committee made a very careful study of the conditions which obtained in the concrete products industry and would affect the standardization of sizes. The members of the committee were all men of experience either in the manufacture or the use of concrete building materials. They sent out a questionnaire which was responded to in fine shape by representative concrete products manufacturers. At the invitation of the Division of Simplified Practice the committee met in Washington in June, 1923, and discussed the steps which would be necessary for reduction in the number of sizes which could be practically carried out in the industry.

The data which was collected by this sub-committee was tabulated and after many conferences with the representatives of the Portland Cement Association and the Concrete Products Association were placed in definite form of recommendations. These recommendations were presented at the annual convention of the American Concrete Institute held in Chicago during February, 1924, where they were adopted as tentative standards by the American Concrete Institute.

In the meantime the Portland Cement Association sent an invitation to the manufacturers of concrete products machinery to attend a meeting to discuss the simplification of sizes of building units because it was felt that, as they were manufacturers of equipment, the question of unit sizes would be of vital interest to them. This meeting had a very good attendance and the results obtained were due in no small measure to a representative of the Division of Simplified Practice who was present. Resolutions at this meeting were drawn up which embodied sizes of concrete block and brick and which were not very different from those which were adopted as tentative standards by the American Concrete Institute. It is interesting to note that, although the machinery manufacturers and the American Concrete Institute worked entirely independently, their results conformed closely enough so that the final standards adopted by the division correspond closely to both standards.

The final convention was held in Chicago on October 16 and was attended by men representing the American Concrete Institute, Portland Cement Association, Concrete Products Association, Concrete Block Machinery Manufacturers' Association, trade papers and local block associations. The findings of Committee P-1, A. C. I., served as a basis of discussion and were adopted with the exception that slight tolerances in some dimensions were allowed. Former recommendations have called for a difference in size between common and faced concrete brick, but it was decided that one standard could very well serve for both of these types of brick. Attention was called to the fact that up to the present time no consideration had been given to concrete partition tile, and a list of sizes was considered and adopted with a comparatively small amount of discussion. At the conclusion of the meeting the Division of Simplified Practice was requested to get an expression of opinion from the entire concrete building unit industry as to the acceptance of the sizes adopted and to appoint a standing committee to represent the conference. When an 80% acceptance is obtained, the recommendations will be published in the "Elimination of Waste" series of the Department of Commerce.

The sizes which will be recommended by the U. S. Department of Commerce through the Bureau of Standards are tabulated below:

CONCRETE BLOCKS

Height, in.	Tolerance, in.	Width, in.	Tolerance, in.	Length, in.	Tolerance, in.
7¾	Minus ⅛	6	Minus ¼	15¾	Minus ⅛
7¾	Minus ⅛	8	Minus ¼	15¾	Minus ⅛
7¾	Minus ⅛	10	Minus ¼	15¾	Minus ⅛
7¾	Minus ⅛	12	Minus ¼	15¾	Minus ⅛

CONCRETE BUILDING TILE*

	Height, in.	Width, in.	Length, in.
Load bearing	5	3¾	12
	5	8	12
	5	12	12
Partition	3	12	12
	4	12	12
	6	12	12
	8	12	12
	10	12	12
	12	12	12

*Note—Not more than 3 per cent permissible variation over or under for dimensions covering height, width or length.

CONCRETE BRICK

	Height, in.	Width, in.	Length, in.
Face and common	2¼	3¾	8

Contractor Buys California Gravel Plant

THE Standard Rock and Gravel Co. of Burkank, Calif., has been purchased by the Hammond Lumber Co., which has secured the contract for sand and gravel for the Pacoima dam.—*Burbank (Calif.) Pathfinder.*

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning October 13:

Central Freight Association Docket

9286. Cement. Osborn, Ohio, to Cincinnati, Ohio, and Jeffersonville, Ind. Present, 13½ cents and 20 cents; proposed, 6 cents and 9 cents. These rates are to apply only on traffic destined to points south of south bank of Ohio river and east of Mississippi river, to which through joint rates are not in effect.

9288. Crushed stone. Limestone, Ohio, to Cleveland, Ohio. Present, 15 cents; proposed, 90 cents per net ton.

9289. Crushed stone. McVittys, Ohio, to Ohio City, Ohio. Present, 13½ cents; proposed, 90 cents per net ton.

9290. Crushed stone. France Quarries, Ohio, to Kent, Ohio. Present, 18 cents; proposed, $1.10 per net ton.

9295. Crushed stone. Chicago and points taking same rates as named in C. F. A. T. B. Trf. 197G, to Glendors, Baroda and Derby, Mich. Present, $1.15 per net ton; proposed, $1.01 per net ton.

9297. Sand. Richmond, Ind., to Horatio, Ohio. Present, 11½ cents; proposed, 70 cents per net ton.

9298. Sand and gravel. Cleveland, Ohio to Ohio. Proposed rates, in cents per net ton:

To	
Hudson	70
Custaloga	110
Loudonville	110
West Lebanon	110
Holmesville	110
Millersburg	110
Killbuck	110
Brinkhaven	120
Mt. Vernon	120
Walhouding	120
Cadiz	140
Fernwood	140
Salineville	110
Yellow Creek	110
East Liverpool	120
Toronto	140
Tiltonville	140
Bridgeport	140
Bellaire	140
Powhatan	150
Berlin Center	100
Leetonia	100
East Palestine	110

Rates shown above are to apply in open-top equipment only; when loaded in box-car equipment, the rates will be 115% thereof.

From Cleveland, Ohio (P. R. R.)

To	Proposed
Bedford	60
Barberton	70
Orrville	90
Wooster	90
Mansfield	110
Centersburg	120
Westerville	130
Columbus	130
Coshocton	110
Trinway	110
Newark	130
Zanesville	130
Earlville	70
Ravenna	70
Alliance	80
Dover	90
Strasburg	90
New Comerstown	110
Cambridge	130
Caywood	140
Marietta	140
Port Washington	110
Uhrichsville	110
Bowerston	120
Jewett	120
Steubenville	140
Warren	90
Youngstown	100
Lowellville	100

Rates to apply on gravel and sand when loaded in open cars; when loaded in box cars rates will be 15% higher.

9300. Sand and gravel. North Berne, Ohio, to Columbus, Ohio. Present, 80 cents per net ton; proposed, 70 cents per net ton.

9307. Sand (other than blast, engine, foundry, glass, molding or silica) and gravel. Bangs, Ohio, to Fredericksburg, Ohio. Present, $1 per net ton; proposed, 80 cents per net ton.

9308. Crushed stone. Lima, Ohio, to Ohio. Present, 13½ cents to Greenville, D. & U. crossing, Rush's, Nowlins Crossing and Hill Grove, Ohio; 14 cents to Dayton, Miami City, Arcanum, Delisle and Jays, Ohio, and 14½ cents to Trotwood, Air Hill, Brookville, Dodson, National Road, Wengerlawn, Verona and Gordon, Ohio, per Agt. Jones' Trf. I. C. C. 941; proposed, 70 cents per net ton to all points except Rush's Nowlins Crossing and Hill Grove, Ohio; to the excepted points, 80 cents per net ton.

9318. Crushed stone. Findlay, Ohio, to Fostoria, Ohio. Present, 60 cents per net ton; proposed, 50 cents per net ton.

9319. Lime, new process. Danbury, Genoa, Marblehead, Martin and Rockyridge, Ohio, to Wellsville, Ohio. Present, 17 cents; proposed, 16 cents.

9320. Sand and gravel. Mechanicsburg Gravel Pit, Ohio, to (a) Hebron, Ohio, (b) Linworth, Ohio. Present, 14 and 13 cents; proposed, 90 and 80 cents per net ton.

9322. Furnace and foundry limestone, Jackson Centre, Penn., to Ohio and Pennsylvania. Present, 11½ cents to New Castle and Sharpsville, Penn.; 12 cents to Sharon, Penn; 13 cents to Lowellville. Struthers and W. Middlesex, Penn., and 13½ cents to Youngstown and Girard, Ohio; proposed, 55 cents per gross ton.

9326. Lake sand and gravel. Sandusky, Ohio, to Conneaut, Ohio. Present, $2.20 per net ton; proposed, $1.50 per net ton.

9327. Sand and gravel. From Bidwell, Enterprise, Gallipolis, Hamden, Hawks, Kerrs, Mills, Pomeroy, Rockbridge, Sugar Grove, Vinton and Wellston, Ohio, to Michigan. Present, $4.28 per net ton to Coleman, Farwell, Midland and Mt. Pleasant, Mich., and $4.54 per net ton to Baldwin, Big Rapids, Claire, Edmore, Hart, Howard City, Ludington, Pentwater, Reed City, Rodney and White Cloud, Mich.; proposed, $3.78 per net ton.

9342. Sand and gravel. Deeter, inclusive, to La Paz Jct., inclusive. Present, $1.04 per net ton; proposed, 92 cents per net ton.

9345. Sand, viz.: Blast, engine, foundry, glass, loam, molding or silica. James Siding (Belmar), Penn., to Corry, Penn. Present, $2.80 per net ton; proposed, $1.26 per net ton.

9346. Crushed stone, Melvin, Ohio, to Vandalia, Ohio. Present, 14 cents; proposed, 80 cents per net ton.

9347. Sand and gravel. Palestine, Ill., Merom and Riverton, inclusive, to Clear Creek, Smithville, Harrodsburg, Guthrie, Logan, Murdock and Bedford, Ind. Present, 14½ cents; proposed, $1.04 per net ton.

9348. Cement, common, hydraulic, natural or portland. Speeds and Sellersburg, Ind., to Evansville, Ind. Present, 11 cents; proposed, 8 cents. Note: Will apply as proportional rate on traffic destined to all points in the state of Kentucky, as shown in Agent Jones Trf. I. C. 1493, except the following: Group A, Alcorn, Alpine, Avon, Bowen, Bryant, Burgin, Burnside (C. N. O. & T. P.), Camp Daniel Boone, Cedar Grove (C. N. O. & T. P.), Centerville, Cumberland Falls, Danville, Elihu, Elizabeth, Elmendorf, Eubank, Faulconer, Fenwck, Ferguson (Cincinnati, New Orleans & Texas Pacific Ry.), Flat Rock, Floyd, Fonde, Fort Garrett, Geary, Georgetown, Greenwood, Hamilton, Hayden House, High Bridge, Hutchinson, Indian Head, Junction City, Keene, Kenney (L. & N.), Kings Mountain, Lexington, Logans, McKinney, Marsh, Middlesboro, Midway, Million, Montrose, Moreland, Muir, Nealton, Newton, Nicholasville (L. & N.), Norwood, Paris (L. & N.), Paynes, Perry, Pinskard, Pine Knot, Pulaski, Revillo, Richmond, Science Hill, Silverville, Sloans Valley, Somerset, South Fork, Sterns, Sunol, Tateville, Valley View, Waynesburg, Whitley, Whitlock, Wiberg, Winchester (L. & N.), Wright (L. & N.), Wyandotte, Yarnallton. Group B, Henderson, Louisville, Owensboro.

9351. Sand and gravel. South Dayton, Ohio, to Dayton, Ohio. Present, 50 cents per net ton; proposed, 40 cents per net ton.

9352. Sand, viz.: Blast, engine, foundry, glass, molding and silica. Bear Creek, Ill., to Poseyville and Evansville, Ind. Present, $2.52 per net ton; proposed, $1.64 and $1.76 per net ton.

9354. Gravel. Zanesville, Dresden, Ellis and Gilbert, Ohio, to Ohio, in cents per net ton:

To	Present	Proposed
Cleveland, Ohio	120	100
Alliance, Ohio	120	110
Orrville, Ohio	120	90
Canton, Ohio	110	100
Oneida, Ohio	120	110
Mansfield, Ohio	120	90
Brinkhaven, Ohio	90	80
Junction City, Ohio	80	70
Bremen, Ohio	80	70
Washington C. H., Ohio	110	100

9363. Sand, gravel. Winona Lake, inclusive, to Michigan City, inclusive. Present, $1.15 per net ton; proposed. 95 cents per net ton.

9373. Crushed stone. Monroe, Mich., to Dunlaps, Ind. Present, $2.02 per net ton; proposed, $1.26 per net ton.

9376. Crushed stone. White Sulphur, Ohio, to Vandalia, Ohio. Present, 14 cents; proposed, 90 cents per net ton.

9380. Sand (other than blast, engine, foundry, glass, loam, molding or silica) and gravel. Saegertown, Penn., to Pennsylvania, in cents per net ton:

To	Present	Proposed
Kennard	90	80
Greenville	90	80
Shenango	90	80
Transfer	90	80
Sharpsville	105	90
Sharon	105	90
Farrell	105	90
Wheatland	105	90
West Middlesex	105	90

Illinois Freight Association Docket

2779. Lime. Carloads, minimum weight 30,000 lb., from Mosher and St. Genevieve, Mo., to Nason, Ill. Present, combination of locals; proposed, 14½ cents per 100 lb.

2763. Sand, molding. Carloads, minimum weight 90% of the marked capacity of car; except when loaded to full visible capacity actual weight to apply, but not less than 40,000 lb., from Rockton, Ill., to Champaign, Lincoln, Quincy, Springfield and Urbana, Ill. Present, combination rate; proposed, $1.76 per net ton.

2764. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible or cubical capacity actual weight to apply, but not less than 40,000 lb., from Maunie, Ill., to Francis, Rector and Eldorado, Ill. Present, $1.20 per net ton; proposed, $1.04 per net ton.

2766. Sand, gravel and crushed stone. Carloads, minimum weight marked capacity of car; except when loaded in open-top cars to full visible capacity, actual weight will apply from Alton, Pekin, Peoria, Mackinaw and Lincoln, Ill., to various destinations in I. R. C. territory, e. g. Rates in cents per net ton:

From Alton, Ill., to	Present	Proposed
Decatur, Ill.	88	101
Alexander, Ill.	101	113
New Salem, Ill.	113	139
Quincy, Ill.	126	139
From Peoria and Pekin, Ill., to		
Decatur, Ill.	.....	101
Alexander, Ill.	101	113
New Salem, Ill.	113	139
Quincy, Ill.	.....	139
From Mackinaw, Ill., to		
Decatur, Ill.	88	101
Alexander, Ill.	101	113
New Salem, Ill.	113	139
Quincy, Ill.	.....	139
From Lincoln, Ill., to		
Decatur, Ill.	88	88
Alexander, Ill.	101	101
New Salem, Ill.	113	126
Quincy, Ill.	139	126

2774. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity, actual weight to apply from Chillicothe, Ill., to Larchland, Ill. Present, $1.26 per net ton; proposed, $1.13 per net ton.

2775. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity, actual weight to apply, from Spring Valley, Ill., to LaFayette, Toulon, Stark and Wady, Petra, Ill. Present. Class E; proposed, $1.05 per net ton.

2784. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity, actual weight will apply, from Metropolis, Ill., to Huey, Ill. Present, Class E; proposed, $1.13 per net ton.

2787. Sand, gravel and sand and gravel pit strippings. Carloads, minimum weight 90% of the marked capacity of car; except when loaded to full visible capacity, actual weight to apply, but not less than 40,000 lb., from Koss Spur, Iowa, to East Dubuque, Ill., proposed 80 cents per net ton; and to Menominee, Galena, North Hanover and Elizabeth, Ill., proposed 90 cents per net ton; present, combination via Dubuque, Iowa.

2788. Sand, gravel and crushed stone. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible or cubical capacity, actual weight to apply, but not less than 40,000 lb., from Ritchie, Ill., to Wabash Ry. Illinois stations, viz., in cents per ton:

To	Present	Proposed
Custer Park to Emington	50 to 101	50
Saunemin to Strawn	101 to 126	63
Sibley to Blue Ridge	126 to 139	76
Mansfield to Monticello	139	80
Bermont to Decatur	139 to 151	88
Entire Streator Branch	113 to 139	76

2789. Sand and gravel. Carloads, minimum weight marked capacity of car, from Palestine, Ill., to Salem, Ill. Present, $1.39 per net ton; proposed, $1.13 per net ton.

2790. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity, actual weight will apply, from Millington, Wedron, and Yorkville, Ill., to Witton, Galena, and East Dubuque, Ill. Present, $1.13 per net ton; proposed, $1.03 per net ton.

2793. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity, actual weight will apply, but not less than 40,000 lb., from Muscatine, Iowa, to Belleville, Ill. Present, 16 cents; proposed, $1.90 per net ton.

2794. Sand and gravel. Carloads, minimum weight marked capacity of car, from Coleman, Ill., to Amboy, Ill. Present, $1.13 per net ton; proposed, $1.01 per net ton.

2798. Sand (except glass, silica and molding sand) and gravel. Carloads, minimum weight marked capacity of car; except when car is loaded to full visible capacity, actual weight to apply, but not less than 40,000 lb., from Ottawa, Ill., to Joliet, Birds Bridge, Minooka and Morris, Ill. Present, 88 cents; proposed, 76 cents.

2803. Stone and chats, crushed, and ground limestone, carloads. To cancel all commodity rates on, as published under description J of L. & N. R. R., I. C. C. A15193, from St. Louis, Mo., East St. Louis and Belleville, Ill., to L. & N. R. R. St. Louis Division local stations.

Stone and chats, crushed, carloads. To cancel all commodity rates on, as published under Description C, page 1689 of tariff above mentioned, from East St. Louis, Ill., to L. & N. R. R. St. Louis Division local stations.

Stone and chats, crushed, and ground limestone, carloads. To cancel commodity rates on, from L. & N. R. R. St. Louis Division junction points to St. Louis, Mo., East St. Louis and Belleville, Ill.

Stone, crushed, carloads. To establish proportional commodity rates on, from East St. Louis, Ill. (when for beyond), to L. & N. R. R. St. Louis Division local junction points, viz.: Ashley, Ill., 90 cents; Belleville, Ill., 70 cents; Cami, Ill., Eldorado, Ill., Enfield, Ill., Junction, Ill., $1.30; Mt. Vernon, Ill., $1; Nashville, Ill., 90 cents; O'Fallon, Ill., 70 cents; Shawneetown, Ill., $1.40; Woodland, Ill., $1 (per gross ton).

2806. Stone, crushed. Carloads, minimum weight 90% of the marked capacity of car; except when loaded to full visible capacity, actual weight will apply, but not less than 40,000 lb., from Chasco, Ill., to Cairo, Ill. Present, 88 cents per net ton; proposed, 90 cents per net ton.

New England Freight Association Docket

7123. Lime. From Swanton, Highgate Springs, Fonda Junction, and Winooski, Vt., to destinations in Trunk Line territory on a basis slightly higher than 80% of the 6th class rate and comparable with rates in effect from Trunk Line producing points to New England destinations. Reason: To give producers on the C. V. Ry. an opportunity to market their product in Trunk Line territory.

Southern Freight Association Docket

16283. Cancellation of commodity rates on sand. It is proposed to cancel present commodity rate on sand, carloads, from Chattanooga, Tenn., to Tallapoosa, Ga., as published in So. Ry. I. C. C. A9456, account of no movement. Interstate local rate to apply after cancellation.

16294. Rate on slag. It is proposed to establish a rate of $1.02 per net ton on slag, carloads, from Anniston, Ala., to Piedmont, Ala., via L. & N. R. R., Wellington, Ala., and S. A. L. Ry., the same as in effect to Rockmart, Ga., same to apply in lieu of North Birmingham, Ala., combination of $1.69 per net ton.

16320. Sand and gravel from Norris, Ga., to Blitchton, Ga., and sand, carloads, from Norris, Ga., to Port Wentworth and Savannah, Ga. Present rate on sand and gravel, carloads, to Blitchton, $1.74; proposed, $1.58 per net ton, made on basis of the proposed, Georgia-Alabama joint trunk line scale, less 10%. Present, on sand, carloads, to Port Wentworth and Savannah, Ga., $1.49; proposed, $1.40 per net ton, made with relation to rates from C. & W. C. Ry. pits at Beech Island, Ellenton and Jackson, S. C., to Savannah, Ga.

16325. Crushed stone. Carloads, from Ladds, Ga., to stations on the Ga. & Fla. Ry., Valdosta, Ga., to Madison, Fla., inclusive, and to stations on the S. A. L. Ry., Lake City to Greenville, Fla., inclusive. It is proposed to reduce the present rate to be in line with rates in effect on slag, carloads, from Birmingham, Ala., to these destinations. Statement of present and proposed rates will be furnished interested parties upon request.

16359. Cement. Carloads, from Nashville, Tenn., to I. C. R. R. stations, viz.: Raine, Tenn.; White Haven, Tenn., to Horn Lake, Miss., inclusive; Jenivee, Miss., to Nesbitt, Miss., inclusive; and Hernando, Miss. Present, 19 cents; proposed, 17 cents per 100 lb., made not higher than present rate from Birmingham, Ala.

16364. Rates on gravel. It is proposed to establish rates on gravel. Carloads, minimum weight capacity of car, from Millers, Ala., local point on the A. G. S. R. R., to Livingston, Hixon, Sparkman, York, McConnell, and Cuba, Ala., also local stations on the A. G. S. R. R., on basis of the Georgia-Alabama scale in Docket 4136, less 10% reduction of July 1, 1922, in lieu of present rates, which are somewhat higher.

16401. Sand and gravel. Carloads, from Knoxville, Tenn., to Somerset, Ky. Present, $1.53 per net ton; proposed, $1.40 per net ton, same as current rate from Chattanooga, Tenn., to Somerset, Ky.

15421. Slag. Carloads from Alabama City, Attalla, Gadsden and Anniston, Ala., to Camilla, Ga. Combination rates now apply. Proposed, $1.92 per net ton, same as rate in effect from Birmingham, Ala.

16441. Sand and gravel. Straight carloads, from Memphis, Tenn., to Humboldt and Bells, Tenn. Present, $1.20 per net ton; proposed, $1.13 per net ton, same as rate applicable from Cairo, Ill.

16491. (Carrier.) Gravel. Carloads, minimum weight marked capacity of car, from Jackson's Lake, Prattsville Junction, Oktamulke and Coosada, Ala., to Florence, Ala. Present, 26 cents per 100 lb.; proposed, $1.76 per net ton, same as rate from Montgomery, Ala., to Florence.

16493. Rates on cement, carloads. It is proposed to restrict the application of the arbitrary mileages shown in Item No. 12, page 3 of L. & N. R. R. Trf. G. F. O. 115B, from applying on cement, carloads, which will permit actual mileage rates to apply; except in those instances where specific rates are published. It is proposed to publish the following specific rates (the same as applicable via the So. Ry) on cement, carloads, in lieu of the present mileage rates, applicable only on traffic received from or delivered to connecting lines, having origin, destination and entire transportation within the state of Alabama:

Rates per ton of 2000 lb. between Anniston, Ala., and	Cents
Birmingham, Ala.	169
Thomas, Ala.,	169
Ensley, Ala.	169
Woodward, Ala.	180
Bessemer, Ala.	180
Boyles, Ala.	169
N. Birmingham, Ala.	169
Woodlawn, Ala.	169

16505. Sand, molding. Carloads, minimum weight 50,000 lb., from Ohio river crossing and points taking same rates to Greensboro, N. C. Present, from Cincinnati, Ohio, and Louisville, Ky., groups, $4.62 per net ton; proposed, $4.28 per net ton, made not higher than present rate to Raleigh and Winston-Salem, N. C. From Evansville, Ind., Cairo, Ill., and Paducah, Ky., group, 36½ cents per 100 lb. (Class A), or $7.30 per net ton. Proposed, 90 cents per ton higher than proposed rate from Louisville, Ky., or $5.18 per net ton.

16546. (Rate suggested by carrier.) Cement. Carload, from Nashville, Tenn., to Missio, Tenn. Present, 43 cents (6th Class); proposed, 16 cents per 100 lb., same as rate in effect to Woodstock, Tenn.

16549. Sand or gravel. Carloads, minimum weight, marked capacity of car; except where car is loaded to full visible capacity, actual weight will govern, from Bigbee, Miss., to St. L. S. F. Ry. stations in Alabama. Present rates range from 9 cents per 100 lb ($1.80 per net ton) to Winfield, Ala., up to 13½ cents per 100 lb. ($2.70 per net ton) to Thomas, Ala. Proposed rates range from 75 cents up to $1 per net ton to the destinations in question, and are proposed in order that shippers at Bigbee, Miss., may meet competition at Sulligent and Crews, Ala.

Southwestern Freight Bureau Docket

2398. Slag. To establish to Beaumont, Tex., a rate of 10½ cents per 100 lb., and to Houston and Galveston, Tex., a rate of 12 cents per 100 lb. on slag. Carloads, minimum weight 80,000 lb., from New Orleans and points in the New Orleans switching limits, also from Baton Rouge and North Baton Rouge, La. Shippers claim that the present rates are too high to permit movement. Proposed rates are in line with those now published on sand and gravel.

2512. Sand and gravel. To amend Item 3395 of S. W. L. Trf. 21R, naming rates on sand and gravel, carloads, from Anchorage, La., to points in Texas by adding Port Neches, Tex., as a point of destination at the same rate as applicable to Port Arthur. It is stated that Port Neches, Tex., is located about two miles from Port Arthur, Tex., and it has always been customary to publish the Port Arthur basis to Port Neches.

2513. Crushed stone. To establish a rate of $6.60 per ton on crushed stone, carloads, minimum weight 80,000 lb., except when loaded in cars of less capacity, in which case the minimum weight is to be the capacity of the car, from Tate, Ga., to Oklahoma City, Okla. It is stated that the proposed rate is based upon the lowest combination of locals.

Texas-Louisiana Tariff Bureau Docket

5989. Lime. Carloads, rates on from Austin, Dittlinger, McNeil and Round Rock to Beaumont, Orange, Atreco, Magpetco, Port Arthur, Port Neches, Sabine Pass, Smith's Bluff and West Port Arthur. Proposition from carriers to cancel special rates on lime, carloads, from Austin, Dittlinger, McNeil and Mound Rock to Beaumont Port Arthur group points as shown in Items 8872A and 8875A, Sup. E, Trf. 2H, allowing current mileage scale of rates to apply.

Trunk Line Association Docket

12270. To cancel present commodity rates on slag from Newport, Penn., to stations on the P. R. R., C. R. R. of H. J., D. & H. Co., D. L. & W. R. R., Erie R. R., H. & B. T. M. R. R., L. V. R. R., N. Y. O. & W. Ry., N. Y. C. R. R. and Western points; also from Mt. Union, Penn., to Pennsylvania R. R. stations. Classification basis to apply. File 26660.

Reasons for above proposals, account rates being obsolete.

12288. Sand, building (A) Carloads (B) Sand, glass, engine, molding, ground flint, quartz and silex, from Mapleton District, Penn., to Birdsboro, Penn., (A) $2.05, (B) $2.25. Also to avoid Fourth Section Departures, the following points to be adjusted to the basis as proposed to Birdsboro: Dowington, Penn.; Reading, Penn.; Lebanon, Penn.; Annville, Penn.; Brownstone, Penn.; Hershey, Penn.; Palmyra, Penn.; Cleona, Penn.; Avon, Penn.; Prescott, Penn.; Myerstown, Penn.; Richland, Penn.; Womelsdorf, Penn.; Robesonia, Penn.; South Mountain, Penn.; Wernersville, Penn.; Lorane, Penn. Also advance the rate from Mapleton District to Sinking Spring, Penn., to the basis of (A) $2.05, and (B) $2.25 per net ton. File 27074.

Western Trunk Line Docket

2051-I. Stone, crushed, chats (lead or zinc mine refuse), and stone (rubble or rip rap). Carloads, from Jasper, Pipestone, Quartzite, Minn., and Sioux Falls, S. D., to Austin, Minn. Present, 9½ cents (combination on Albert Lea); proposed, 8½ cents per 100 lb. Minimum weight 90% of marked capacity of car, except when car is loaded to full visible capacity, actual weight will apply but not less than 50,000 lb.

2898A. Sand and gravel. Carloads from Rock Rapids, Iowa, to Sibley, Iowa. Present, $1 per ton of 2000 lb.; proposed, 70 cents per ton 2000 lb. Minimum weight 90% of marked capacity of car except when car is loaded to full visible capacity, actual weight will apply, but not less than 40,000 lb.

Idaho Phosphate Company Reorganizes

A MEETING of the stockholders of the Bear Lake, Idaho, Phosphate Company was held in their offices last week for the purpose of perfecting a reorganization and electing officers for the ensuing year. The lineup is Jas. L. Dunford, president; Joseph Stucki, vice-president; and Earl Shepherd, secretary-treasurer. The directors are E. T. Budge, Charles Wyler, Jas. L. Dunford, Joseph Stucki, Earl Shepherd, S. W. Matthews and James Jacobson.—*Paris (Idaho) Post.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00		1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	
Coldwater, N. Y.			1.50 per net ton all sizes			
Columbia, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30		
Northern New Jersey			1.60			
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	
Walford, Penn.		1.30b	1.30b	1.40b	1.40b	1.60c
Watertown, N. Y.	1.00		1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.50		1.50	1.25		
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.10	1.00	1.00
Buffalo, Iowa	.90		1.25	1.05	1.10	1.10
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Cypress, Ill.	1.25	1.30	1.25	1.25	1.25	1.15
Dundas, Ont.	.75	.90	.90	.80	.80	.80
Greencastle, Ind.	1.25	1.25	1.15	1.05	1.05	1.05
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood, Iowa	.90		1.20	1.00	1.10	1.10
Northern Wisconsin	.75		1.05	.95	.95	
St. Vincent de Paul, P. Q.	.75	1.25@1.45	1.10	1.00	1.00	1.00
Stone City, Iowa	.75			1.10@1.20	1.05	
Toronto, Canada	2.00‡	2.00‡	2.00‡	1.80‡	1.80‡	1.80‡
Valmeyer, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Waukesha, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Youngstown, Ohio				1.50	1.60	1.60
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	
Bridgeport, Texas	1.50	1.35	1.25	1.25	1.20	1.15
Cartersville, Ga.	1.50	1.50	1.50	1.00	1.00	1.00
El Paso, Texas	1.00	1.00	1.00	1.00	1.00	
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	
Graystone, Ala.		Crusher run fluxing stone, 1.00 per net ton				
Graysville, Ga.	1.00@1.25	1.00@1.25		.85@1.25	.85@1.25	
WESTERN:						
Atchison, Kans.	.50	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.10	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.35		1.25	1.25	1.00	
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.60	1.35	1.15	1.00	
Cypress, Ill.	1.00@1.10					
Duluth, Minn.	1.00	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	
Eastern Maryland	1.10	1.75	1.70	1.60	1.50	1.50
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.75	1.70	1.60	1.50	1.50
Minneapolis, Minn.	1.25		2.25	2.00	1.75	
New Haven, Conn.	.60	1.60@1.75	1.35@1.50	1.15@1.30	1.00@1.10	
Northern New Jersey	1.40@1.50	1.40@2.00	1.80	1.40	1.40	
Oakland and El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	
Richmond, Calif.	1.00*		1.50*	1.50*	1.50*	
Springfield, N. J.	2.00	2.00	2.00	1.70	1.60	1.50
San Diego, Calif.	.50@ .75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	
Eastern Penn.—Sandstone	1.25	1.65	1.60	1.40	1.40	1.25
Eastern Penn.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite Sand	.50	1.75	1.75	1.25	1.15	
Lohrville, Wis.	1.65	1.65@1.70	1.65	1.45	1.50	
Middlebrook, Mo.—Granite	3.00@3.50		2.00@2.25	2.00@2.25	2.00@2.25	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	

*Cubic yd. †1 in. and less. ‡Prices include 90c freight. ‖Rip rap per ton. (b) Less 5c 10 days; (c) less 10c 10 days (2¾" to ⅝").

Agricultural Limestone (Pulverized)

Alton, Ill. — Analysis, 98% $CaCO_3$; 90% thru 100 mesh — 6.50

Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk — 2.75

Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) — 5.00

Bridgeport and Chico, Texas; bulk — 5.50

Cartersville, Ga.—Analysis 68% $CaCO_3$, 30% $MgCO_3$; pulverized — 2.00
50% thru 50 mesh — 1.50

Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk — 2.50

Colton, Calif.—Analysis, 95% $CaCO_3$. 3% $MgCO_3$—all thru 20 mesh—bulk — 4.00

Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk — 3.00

Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, $5.00; bulk — 3.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk — 2.50

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk — 2.70

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk — 2.75

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk — 3.50

Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton — 2.00

Mayville Wis.—59.8% thru 60 mesh — 2.35

Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags — 5.00

Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) — 5.00

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 — 2.10● 2.25
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk — 3.50
100% thru 100, 85% thru 200; bags, 7.00; bulk — 5.50

Rockdale, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk — 3.25

Watertown, N. Y.—Analysis, 96-98% $CaCO_3$, pulverized limestone, bags, 4.00; bulk — 2.00

West Stockbridge, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk — 3.25

Agricultural Limestone (Crushed)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 100 mesh — 1.50

Alton, Ill.—Analysis 98% $CACO_3$; 50% thru 4 mesh — 3.50

Bedford, Ind.—Analysis, 98½% $CACO_3$, ½% $MgCO_3$; 90% thru 10 mesh — 1.50

Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh — 1.50

Blackwater, Mo.—95% $CaCO_3$; 100% thru 8 mesh — 1.00

Bridgeport, Texas — Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 50% thru 50 mesh; 90% thru 4 mesh. Fines one-half dust — 1.50

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh — 1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80
Cypress, Ill. — Analysis, 90 to 96% $CaCO_3$; 50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh 1.90
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50
Kansas City, Mo.—50% thru 100 mesh 1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh 2.00
Screenings (¼ in. to dust) 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 85% thru 10 mesh; 53% thru 50 mesh; 40% thru 100 mesh bulk 2.60
32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 2.25
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind. — Analysis, 52% $CaCO_3$, 44% $MgCO_3$; meal, 100% thru 4 mesh, 35% thru 100 mesh .... .75@ 1.50
Milltown, Ind. — Analysis, 94.41% $CACO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh .38% thru 50 mesh .... 1.45@ 1.60
Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$ —50% thru 100 mesh; 50% thru 4 mesh 1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh 1.25
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk 3.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton.

Glass Sand:

Aetna, Ind. (Box cars, net) ..... .35
Berkeley Springs, W. Va. ..... 2.25@ 2.50
Cedarville and S. Vineland, N. J.—
Damp 1.75
Dry 2.25
Cheshire, Mass:
6.00 to 7.00 per ton; bbl. 2.50
Columbus, Ohio ..... 1.25@ 1.50
Estill Springs and Sewanee, Tenn. 1.50
Grays Summit and Klondike, Mo. 2.00
Mapleton Depot, Penn. ..... 2.00@ 2.25
Massillon, Ohio 3.00
Millville, N. J.—Green bottle sand ..... 1.75@ 2.25
Mineral Ridge and Ohlton, Ohio 2.50
Oceanside, Calif. ..... 3.00@ 3.40
Pacific, Mo. ..... 2.25@ 3.00
Pittsburgh, Penn.—Dry 4.00
Damp 3.00
Ridgway, Penn. 2.50
Rockwood, Mich. ..... 2.75@ 3.25
Round Top, Md. ..... 2.00@ 2.25
San Francisco, Calif. ..... 3.00@ 3.50
St. Louis, Mo. ..... 1.50@ 3.00
Thayers, Penn. ..... 1.00@ 2.50
Utica, Ill. 1.25
Zanesville, Ohio 2.50

Foundry Sand:

Aetna, Ind.:
Core, Box cars, net, .35; open-top cars ..... .30
Furnace lining, traction, open-top cars ..... .30
Albany, N. Y.:
Core 1.50
Molding fine, brass molding 2.25
Molding coarse 2.00
Sand blast 4.00
Arenzville, Ill.:
Core ..... .75
Molding fine ..... 1.40@ 1.60
Brass molding 1.75
Beach City, Ohio:
Fine core, washed and screened 1.50
Furnace bottom; steel molding (fine and coarse) washed and screened 2.00
Traction 1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse 5.00
Sand blast ..... 5.00@ 8.00
Stone sawing 6.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95	.....	.....	.85	.....
Erie, Penn.	.....	1.00	.....	1.25	1.50	.....
Farmingdale, N. J.	.58	.48	.85	1.30	1.10	.....
Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Leeds Jct., Maine	.....	.50	1.75	.....	1.35	1.25
Machias, N. Y.	.85	.85	.75	.75	.75	.75
Northern New Jersey	.40@ .50	.40@ .50	.....	1.25	1.25	1.25
Pittsburgh, Penn., and vicinity	1.25	1.25	.85	.85	.85	.85
Shining Point, Penn.	.....	.....	1.00	1.00	1.00	1.00
Washington, D. C.—Rewashed, river	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.	.....	.22@ .40	.20@ .40	.20@ .40	.32@ .40	.....
Columbus, Ohio	.75	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.30	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.75@1.00	.40	.85@1.25	.....	.....	.85
Elkhart Lake, Wis.	.60	.40	.40	.60	.50	.50
Ft. Dodge, Iowa	1.00	.....	2.05	2.05	2.05	.....
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.	.....	.50	.....	.80	.70	.70
Hamilton, Ohio	.....	1.00	1.00§	.....	1.00	.....
Hersey, Mich.	.....	.50	.....	.....	.....	.70
Indianapolis, Ind.	.60	.60	.....	.90	.75@1.00	.75@1.00
Janesville, Wis.	.....	.65@ .75	.....	.....	.65@ .75	.....
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.	.....	.50	1.25	1.25	1.35	.....
Milwaukee, Wis.	1.01	1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.*	.65	2.50†	2.00§	.....	2.00	1.75
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Palestine, Ill.	.75	.75	.75	.75	.75	.75
St. Louis, Mo., f. o. b. cars	1.18	1.45	1.65§	1.45	.....	1.45‖
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	.55	.55	.75	.75	.75	.75
Winona, Minn.	.40	.40	1.25	1.10	1.00	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .60@.65 pit			
Zanesville, Ohio	.70	.60	.60	.....	.90	.....
SOUTHERN:						
Brookhaven, Miss., Roseland La.	.70	.70	2.25	1.50	1.25	.....
Charleston, W. Va.	all sand 1.37 f.o.b. cars		all gravel 1.47 f.o.b. cars			
Chehaw, Ala.	1.24	1.24	.....	1.90	1.90	1.90
Estill Sp'gs & Sewanee, Tenn.	1.00	.90	1.00	1.00	.....	.85
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon and Gallaird, Ga.	.50	.50	.75	.65	.65	.65
New Martinsville, W. Va.	1.00	.90	.....	1.30	.....	.90
WESTERN:						
Baldwin Park, Calif.	.....	.25@ .35	.....	.....	.50@ .75	.....
Crushed rock	.90@1.10	.60@ .90	.60@ .90	.60@ .90	.60@ .90	.....
Kansas City, Mo.	Kaw river sand .75 per ton f.o.b. plants					
Los Angeles, Calif.	1.00*	1.00*	1.50*	1.50*	1.40*	1.40*
Pueblo, Colo.	1.10*	.90*	.....	1.75*	.....	1.60*
San Diego, Calif.	50@ .65	.80@ .90	1.40@1.50	1.20@1.30	1.00@1.10	1.00@1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	.....	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80	.....	.55@ .75	.....	.....	1.00
Brookhaven, Miss., Rosel'd, La.	Road gravel, ballast gravel .60 a ton					
Chehaw, Ala.	.90@1.00	.....	.....	.....	.....	.....
Des Moines, Iowa	Washed, .50; unwashed, .40 (not screened)					
Dudley, Ky.‡	1.05	1.05	.....	.95	.....	.....
East Hartford, Conn.	Sand, .65 per cu. yd.					
Elkhart Lake, Wis.	.50	.....	.....	.....	.....	.....
Gainesville, Texas	.....	.95	.....	.....	.....	.55
Grand Rapids, Mich.	.....	.....	.....	.55	.....	.....
Hamilton, Ohio	.....	.....	.....	.....	.67	.....
Hersey, Mich.	.....	.....	.....	.55	.....	.....
Indianapolis, Ind.	Mixed gravel for concrete work, .65					
Lindsay, Texas	.....	.....	.....	.....	.....	.55
Macon, Ga.	.35	.35	.....	.....	.....	.....
Mankato, Minn.	Pit run gravel, .60					
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.	.....	.....	.....	.....	.....	.60
St. Louis, Mo.	Mine run gravel 1.55 per ton					
Shining Point, Penn.	Concrete sand, 1.10 ton					
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.00	1.00	.....	.....	.....	.....
Zanesville, Ohio	.....	.60	.....	.....	.....	.....

*Cubic yd.; †roofing gravel; §⅝ in. and less; ‡crushed silica; ‖2½ in. and less; (a) ¾ in. and less.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio:		
Core	.25@	.30
Furnace lining		2.50
Molding fine		2.00
Molding coarse	1.50@	2.00
Sand blast	3.00@	4.00
Stone sawing		1.50
Traction	.30@	.65
Brass molding	2.00@	2.50
Dunbar, Penn.:		
Traction (damp)		2.00
Eau Claire, Wis.:		
Sand blast	3.00@	4.25
Elco, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Estill Springs and Sewanee, Tenn:		
Molding fine and coarse, brass molding		1.25
Roofing sand, sand blast, traction		1.50
Franklin, Penn.:		
Core	1.50@	1.75
Furnace lining, molding fine		1.75
Molding coarse		1.50
Brass molding		2.00
Grays Summit, Mo.:		
Molding fine	1.75@	2.00
Joliet, Ill.:		
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@	.85
Klondike, Mo.:		
Molding fine	1.75@	2.00
Mapleton Depot, Penn.:		
Molding fine		2.25
Molding coarse		2.10
Massillon, Ohio:		
Molding fine, coarse, furnace lining core, and stone sawing		2.50
Traction		2.25
Mineral Ridge and Ohlton, Ohio:		
Core		2.25
Furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing, traction (all green)		2.00
Montoursville, Penn.:		
Core, molding fine		1.40
Traction		1.35
New Lexington, Ohio:		
Molding fine		2.00
Molding coarse		1.50
Oceanside, Calif.:		
Roofing sand (stucco)	3.00@	3.40
Ottawa, Ill.:		
Crude silica sand	.75@	1.00
Pacific, Mo.:		
Core, furnace lining	1.00@	1.25
Molding fine	.90@	1.00
Stone sawing	1.00@	1.75
Molding coarse	.85@	1.00
Ridgway, Penn.:		
Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Round Top, Md.:		
Core, molding fine		1.60
Traction		1.75
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50
Molding coarse	1.25@	1.75

Miscellaneous Sands

(Continued)

Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif.:		
(Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@	3.50
San Francisco, Calif. (Direct from Pit)		
Furnace lining, molding coarse, sand blast		3.60
Stone sawing, traction		2.30
Tamalco, Ill.:		
Molding coarse	1.40@	1.60
Brass molding		1.75
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.25
Traction		2.25
Utica, Ill.:		
Core, molding coarse		.75
Stone sawing, furnace lining		1.00
Molding fine		.65
Utica, Penn.:		
Core, molding fine, brass molding		2.00
Molding coarse	1.50@	1.75
Warwick, Ohio.:		
Core, molding fine (green) 1.75; dry		2.50
Furnace lining		2.50
Zanesville, Ohio:		
Sand blast, core, traction		2.50
Furnace lining		2.25
Molding fine and coarse; brass molding	1.50@	1.75

Crushed Slag

City or shipping point		¼ in.	⅜ in.	¾ in.	1½ in.	2½ in.	3 in.
EASTERN:	Roofing	down	and less	and less	and less	and less	and larger
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	3.00	1.00	2.25	1.25	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	2.50	1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45	1.75	1.45		1.45	
Jackson, Ohio		1.30		1.30	1.30	1.30	
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.	2.54	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.30
Buffalo, N. Y.				12.00				
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.		10.50	6.00l					3.25m
Williamsport, Penn.			10.00				6.00	
York, Penn.		10.50	10.50	11.50			8.50	1.65i
CENTRAL:								
Cold Springs, Ohio		9.50	9.00				9.00	
Delaware, Ohio	12.50	9.00	8.00	10.00			9.00	1.60
Gibsonburg, Ohio	12.50				9.00			
Huntington, Ind.	12.50	9.50	9.50		9.00		8.50	1.50c
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		9.50	9.50				8.50	1.50c
Marion, Ohio		9.50	9.50				8.50	1.70j
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.70e
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Woodville, Ohio	12.50†	9.50†	8.50†	12.50†	9.00	10.50	9.00	1.60
SOUTHERN:								
Erin, Tenn.							8.50	1.40*
El Paso, Texas							9.00	1.50
Graystone, Ala.	12.50	11.00	11.00	11.00			8.50n	1.50k
Karo, Va.		10.50	9.00				7.00g	1.65h
Knoxville, Tenn.	12.50	11.00		11.00		1.35	8.50	1.50
Staunton, Va. (boss lime)								1.30
Varnons, Fla. (f)		10.50	6.00	11.00			8.50	1.50
Zuber and Ocala, Fla.	14.00	12.00	10.00				12.00	1.70
WESTERN:								
Kirtland, N. M.							12.50h	
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.50
Tehachapi, Calif.							13.00	2.00d

*And 1.50; †50-lb. paper bags; (a) F. O. B. Kilns; (c) wooden, steel 1.70; (d) to 2.15; (e) wood bbl.; $2.20 drum in steel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 200 lb. bbl.; 2.65, 300 lb. bbl.; (j) steel; (k) jute bags, 1.35; (l) bags; (m) finishing lime, 2.50 common; (n) to 10.00.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.0[illegible]
Pencils and steel workers' crayons, per gross		1.25
Chatsworth, Ga.:		
Crude—f.o.b. cars		4.00
Ground (20-50 mesh) bags extra		6.50
Ground (150-200 mesh) 7.00; bags		10.00
Pencils and steel workers' crayons, per gross		1.50
Chester, Vt.:		
Ground (20-70 mesh)	7.00@	8.00
Ground (150-200 mesh)	8.00@	10.00
(Bags extra, returnable)		
E. Granville, Rochester, Johnson, Waterbury, Vt.:		
Ground talc (20-50 mesh) bags	7.00@	10.00
Ground talc (150-200 mesh) bags	10.00@	25.00
Pencils and steel workers' crayons, per gross	.75@	2.00
Emeryville, N. Y.:		
(Double air floated) including bags; 325 mesh		14.75
Hailesboro, N. Y.:		
Ground (150-200 mesh) bags		18.00
Henry, Va.:		
Crude talc (mine run) per 2000-lb. ton	2.75@	3.50
Ground (150-200 mesh), bags	8.50@	14.00
Joliet, Ill.		
Ground (150-200 mesh) bags	28.00@	30.00
Keeler, Calif.:		
(150-200 mesh); carloads, 30 tons or more (bags extra)	20.00@	30.00
Marshall, N. C.:		
Crude	4.00@	8.00
Ground (20-50 mesh), bags extra	6.50@	8.50
Ground (150-200 mesh), bags	8.00@	12.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), 200-lb. bags	13.00@	15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Centerville, Tenn.—B.P.L. 65%, bags		8.50
Bulk		6.50
Gordonsburg, Tenn.—B.P.L. 68-72%..	4.00@	4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.50@	6.00
13% phosphoric acid, 95% thru 80 mesh		5.75
75% hand mined	6.50@	6.75
75% washed over ¼-in. screen		6.75
75% max. 5½% I and A	6.50@	7.00
78% max. 4½% I and A		8.00
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B P.L.		5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@	8.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$10.00	$8.10	$7.80
24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10	12.60	11.00	8.70	8.75
18x10	12.60	11.00	8.70	8.75
18x 9	12.60	11.00	8.70	8.75
16x10	12.60	11.00	8.40	8.75
16x 9	12.60	11.00	8.40	8.75
16x 8	12.60	11.00	8.40	8.75
18x12	12.60	11.00	8.70	8.75
16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x 8	11.10	10.50	8.10	7.80
14x 7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Ground Rock

(2000 lb.)

Mt. Pleasant, Tenn.—B.P.L. 65%	7.00@	8.00
Twomey, Tenn.—B.P.L. 65%	7.00@	8.00

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.25
70% min. B.P.L., Basis 70%	2.50
72% min. B.P.L., Basis 72%	2.75
75/74% B.P.L., Basis 75%	3.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	18.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	19.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		7.00@ 8.00
Easton, Penn.—Royal green, evergreen, creme, sylvan		10.00@18.00
Grit sizes		3.00@ 5.00
Haddam, Conn.—Felstone buff	12.00	12.00
Harrisonburg, Va.—Blk marble (crushed, in bags	12.50	12.50
Ingomar, Ohio (in bags)		6.00@20.00
Middlebrook, Mo.—Red		20.00@25.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Poultney, Vt., 2000 lb.		6.12
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Cal.—Quartz sized roofing, per ton, in sacks		13.50
Tuckahoe, N. Y.—2000 lb.		12.00@20.00
Wauwatosa, Wis.		20.00@34.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50@ 6.00	4.50@ 6.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	
Baltimore, Md. (Del. to job in city)	16.00@16.50	22.50@50.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	15.25	21.00
Prairie du Chien, Wis.	14.00	21.50@30.00
Puyallup, Wash.	20.00	30.00@100.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	21.00	35.00
Wauwatosa, Wis.	14.00@18.00	30.00@42.00

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.00
Boston, Mass.	14.00@15.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich. (wholesale)	9.00
Jackson, Mich.	13.00
Lancaster, N. Y.	12.50
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00
Plant City, Fla.	11.00@15.00
Portage, Wis.	15.00
Rochester, N. Y. (delivered)	19.75
Saginaw, Mich.	12.00
San Antonio, Texas	12.50@14.00
Syracuse, N. Y.	18.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, Finishing	per ton Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.50	15.50
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	22.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	.....	21.00
New York, N. Y.	18.20	13.10
Philadelphia, Penn.	23.00	16.00
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	22.60	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl.
Albany, N. Y.	.....	2.62
Atlanta, Ga.	.....	2.35
Boston, Mass.	.....	2.53@3.03†
Buffalo, N. Y.	.....	2.38@2.88†
Cedar Rapids, Iowa	.61	2.44
Cincinnati, Ohio	.61¾	2.47
Cleveland, Ohio	.59¾	2.39
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	.59¾	2.39
Dayton, Ohio	.....	2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.	.60	2.40
Duluth, Minn.	.54¾	2.19
Indianapolis, Ind.	.60¾	2.41
Kansas City, Mo.	.54¾	2.47
Los Angeles, Cal. (less 5c dis.)	.65	2.98
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.58¾	2.35
Minneapolis, Minn.	.60½	2.42
Montreal, Canada (sks. 20c ext.)	.....	1.90b
New Orleans, La.	.....	2.40
New York, N. Y.	.....	2.15@2.65†
Philadelphia, Penn.	.....	2.41@2.81†
Phoenix, Ariz.	.82½	3.30
Pittsburgh, Penn.	.54¾	2.19
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	.60½	2.42
Seattle, Wash. (10c bbl. dis.)	.....	3.05
Toledo, Ohio	.61¼	2.45

NOTE—Add 40c per bbl. for bags.
*5c cash disc. 10 days.
†Prices to contractors, including bags.
(b) Less 10c 20 days.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.05
Fordwick, Va.	.....	2.05
Hannibal, Mo.	.....	2.05
Hudson, N. Y.	.....	2.05
Kingsport, Tenn.	.....	2.05
Leeds, Ala.	.....	1.95
Louisville, Ky.	.....	2.45
Northampton, Penn.	.....	1.95
Steelton, Minn.	.50	2.00
Universal, Penn.	.48¾	1.95

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	——Plaster Board—— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	½x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Agatite, Texas (a)	.....	.....	6.00	10.00	10.00	10.50	10.00	.....	19.00	.....	.....	.....	.....
Akron, N. Y. (a)	3.00	4.00	6.00	10.00	10.00	10.00	20.20	7.00@9.00	27.35	21.00	19.375	20.00	30.00@32.00
Black Hawk, S. D.	3.50	.....	7.00	10.00	10.00	10.50	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kans. (a)	2.50	4.00	6.00	10.00	10.00	10.50	10.00	.....	23.15	19.00	19.375	20.00	.....
Denver, Colo.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	.....	6.00	.....	15.00	.....	.....	.....	.....	15.50	.....	.....	.....
Ft. Dodge, Iowa (a)	2.50	4.00	6.00	10.00	10.00	10.50	15.45	.....	22.70	20.00	19.375	20.00	30.00
Grand Rapids, Mich.	2.50†	.....	6.00‡	10.00	10.00‖	10.00‖	.....	.....	.....	.....	.....	.....	.....
Gypsum, Ohio (a)	2.75	4.00	6.00	10.00	10.00	10.00	19.25	7.50	26.85	19.00	19.375	20.00	30.00
Port Clinton, Ohio	3.00	4.00	6.00	8.00	10.00	10.00	20.00	7.50	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	15.40*	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Including sacks at 15c each; (a) prices are net of bags; (†) to 3.00; (‡) to 8.00; (‖) to 12.50.

New Machinery and Equipment

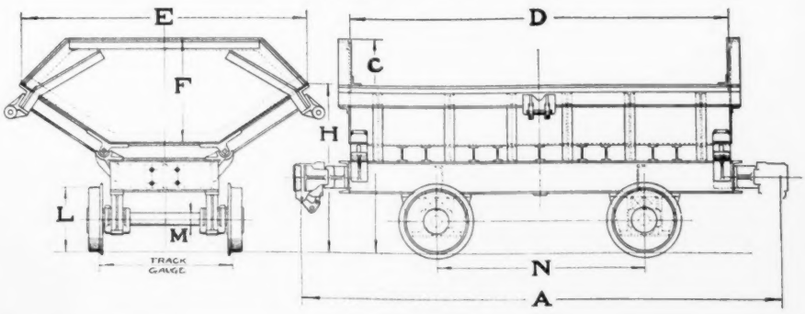
Notable All-Steel Quarry Cars

THE illustrations herewith show the advance being made in quarry transportation methods through the use of constantly larger and stronger units. These cars were built for the Signal Mountain Portland Cement Co., Chattanooga, Tenn., by the Easton Car and Construction Co., Easton, Penn.

Dumping the cars with an air hoist

The cars are all steel, 15 cu. yd. capacity each, dump either way with the use of a compressed-air cylinder Curtis hoist. They right themselves by gravity. This car is the largest size of a standard design now made by the Easton Car and Construction Co.

Another view of car being dumped



Capacity Yards	Track Gauge	Body Length D	Body Width E	Body Depth F	Length A	Height C	Loading Height H	Diam. Wheel L	Diam. Axle M	Wheel Base N
12	4′–8½″	13′–0″	9′–2″	3′–9″	15′–0″	7′– 7″	5′– 8″	33″	6″	8′–0″

Principal dimensions of quarry cars

The new cars being loaded in the quarry of the Signal Mountain Portland Cement Co.

Buchanan All-Steel Crushers

THE idea of issuing a catalog is to give the intending purchaser of a machine information that he needs to judge of its adaptability to his own conditions. Bulletin No. 110, issued by the C. G. Buchanan Co., 90 West street, New York, describing the Buchanan Type C all-steel crushers, does this very well. The description is very complete, every detail of the machine being taken up so that the reader may understand the reason for its being made in a particular way. The bulletin is excellently illustrated and has all the usual tables of sizes, etc.

An excellent feature is the explanation of the adaptation of various sizes to different kinds of crushing and the sizes to which the machine is adapted in crushing very hard rock and rock of medium hardness. There is a very good idea in giving the capacities as average and not peak-load capacities, for the average capacity under the somewhat intermittent conditions of ordinary feeding from quarry cars is what the quarryman wants to know.

The Buchanan Co. claims to be the first builder of all-steel sectional jaw crushers, and it has embodied the experience of years of crusher building in making these machines. Its facilities for manufacturing machines include everything from the raw ore to the finished product, for it operates its own iron mines, blast furnaces and foundries as well as machine shops.

Publicity for Lime

OUR good friend Burton K. Harris, lime manufacturer, Lime Rock, R. I., is thoughtful enough to send the photograph below, showing his exhibit at the Pawtucket Products Exposition held in conjunction with "New England Week" which was observed by industry and agriculture throughout the six New England states September 15-20. Mr. Harris writes:

Exhibit of Lime in Pawtucket Products Exposition

The news item herewith ran in the columns of the local *Pawtucket Times*, together with advertising space. This was the first time this plant had ever been brought to the public attention in this manner and was very creditably received.

You can see by the photograph that considerable prominence was given to the rack of National Lime Association pamphlets and bulletins on the wide variety of subjects, which were in great demand.

Newspaper Article

The lime industry in Rhode Island dates back to a time in local history immediately following the settlement of Providence and its surrounding territory. Those early settlers, in conjunction with their pursuit of agriculture, endeavoring to improve their early homes, must have found the outcroppings of limestone in the "fields of the Smiths," later Smithfield.

Being men of old England, they knew its value as a construction material to improve the quality of the mud used to fill the cracks of their log houses. They did not delay therefore in starting an industry that has persisted to this day.

Although operated by many and various individuals in its earliest history, the industry evolved itself into two well-known competing concerns nearly a hundred years ago. The Harris Lime Rock Co. and the Dexter Lime Rock Co. carried on for many years. They supplied the markets not only of Rhode Island but even delivered "Lime from Lime Rock" overland by ox teams and horses to Worcester and nearby Massachusetts towns.

The opening of the Blackstone Canal about 100 years ago improved delivery to the north and the Providence and Worcester Railroad in 1884 assisted more than ever. During the reconstruction period following the Civil War, at which time many of our local textile mills were built, the quarries here supplied nearly all the lime used for that work.

The local companies went out of existence about 35 years ago and the present operator came into possession of the business of his father, Herbert Harris, who operated between 1890 and 1920.

With the improved roads and methods of motor transportation the market for this material is again extending and the necessities of this vicinity along agricultural, chemical and construction lines are being served by this two and a half century old industry.

Gasoline Taxes and Motor Fees Average Small Amount

THE average license fee per mile of motorists in this country is one-fifth of a cent, and the gasoline taxes paid amounts to 1/25 of a cent, or an average for both of one-quarter of a cent per mile, according to the Bureau of Public Roads of the United States Department of Agriculture. That is what the fees paid in a year amount to when divided by 6000, which is believed to be the average motorist's annual mileage.

The motorist or truck operator is assured of a good return from the taxes he pays, since the receipts are very largely devoted to road construction and maintenance. In 1923, 81% of the motor vehicle license revenues and 58% of the gasoline taxes were turned over to the state highway departments for expenditure under their supervision, and a considerable portion of the remainder was expended by the counties for road purposes.

Consideration of the gasoline tax is of special interest to the motor vehicle operator. Thirty-five states now have this form of tax, the rates ranging from 1 to 3 cents, with the exception of one state, which has a 4-cent tax. A 1-cent gasoline tax increases the cost of operating the average vehicle by less than a 10th of a cent per mile. On a trip from Washington to Philadelphia the tax would amount to 10 cents. The trip over the Lincoln highway from New York to San Francisco would be taxed $2.50. It is interesting to compare these rates with the toll charges which motorists formerly had to pay on toll roads. On six different turnpikes in Virginia and Maryland tolls amounting to $5.05 were charged for a total of 187 miles, which is equivalent to 2.7 cents a mile. If a state attempted to charge this same rate for the use of the public highways by automobiles it would have to establish a gasoline tax of 36 cents per gallon.

Porcupines Relish a Lime Diet

A REPORT of the Pennsylvania highway department states that porcupines eat the whitewash from telegraph poles along the highways which have been whitened in the usual way to mark the road. The "porkies" either anticipated the medical profession or else they have been unusually quick to appreciate the value of calcium compounds in the diet as explained in ROCK PRODUCTS and various medical journals.

News of All the Industry

Incorporations

Dredge Gravel Co., Denver, Colo., has been incorporated for $25,000 by Milton B. Hood, Paul A. Page and Carrie M. Page.

Hattieburg Gravel and Sand Co. has been incorporated under the laws of Delaware for $40,000. (Corporation Trust Co. of America.)

Disintegrated Rock and Gravel Co., Los Angeles, Calif., has been incorporated for $50,000, by R. M. Jennings, S. M. Acosta and Wm. Miller.

Kelp-O-Lite Corp., Portland, Ore., has been incorporated for $10,000, to engage in the sand and gravel business, by G. B. Campbell, J. B. Rutherford and Larry Sullivan.

Thomasville Stone and Lime Co., Baltimore, Md., has been incorporated by D. List Warner, George S. Newcomer and John H. Jackson, with headquarters at 607 Calvert building.

Blue Diamond Co., Dallas, Tex., has been incorporated for $50,000 by R. Carnhan, Pine Bluff, Ark., and Fred Bennett and A. C. Hamilton, Jr., of Dallas, to manufacture mortar and plaster.

Pawtucket Sand and Gravel Co., Pawtucket, R. I., has been incorporated for $25,000. Incorporators: William G. Morin and Rose Morin of North Providence, and Wilfred Dehaltre of Central Falls.

Diamond Hill Stone Products Co., Cumberland, R. I., has been incorporated for $25,000 to operate a stone quarry. Incorporators: Thomas J. Quinn, Ashton; James F. Foley, Pawtucket; and John L. Kemp, Providence.

Rug Brick and Sand Co., Ltd., London, Ont., Canada, has been incorporated for $50,000 by W. H. Thornton and W. R. Eddie, manufacturers; J. H. Plested, builder; R. J. Johnstone, merchant; and F. J. Wakeling, to operate sand pits and make brick and blocks.

Barnhart Cement Products Corp., Beaver Falls, Penn., has been incorporated for $50,000 to manufacture all kinds of concrete building materials, such as block, brick, coping and many other products, included in which will be the making of waterproof and colored cement products. Incorporators: G. E. Barnhart, New Brighton, president; O. C. Grossglass, Beaver Falls, vice-president and secretary; S. R. Hamilton, Beaver, treasurer. (Attorney, L. R. Glass.)

Sand and Gravel

Winchester Gravel Co., Winchester, Ind., has filed certificate of final dissolution.

J. R. and **Richard Knarr**, Troutdale, Ore., have engaged in the sand and gravel business under the name of Knarr & Son.

Paul Heyner has purchased the interest of **O. C. Hansen** in the sand and gravel business of Hansen & Heyner, Snohomish, Wash.

Quarries

E. S. Hall farm, southwest of Breckenridge, Mo., has a ledge of limestone through which workmen have been blasting for several weeks. The bottom of the ledge has been reached finally, and it is stated that the rock is 16½ ft. thick, underlying 7½ ft. of earth.

Johnson & Hudson, Carrollton, Mo., contractors, have leased the Wabash gravel pit seven miles west of Chillicothe, and expect to have it running in about 30 days. It is reported that a $20,000 plant will be erected in the near future. The gravel is to be used for municipal, township, or state highways only, and it is estimated that the pit contains about a million tons of gravel.

Consolidated Stone Co., Bedford, Ind., recently let a contract to Homer Conley for the construction of a building for their Dark Hollow quarries that is to house the mill, machine shop and offices there. Former buildings containing these branches of their Dark Hollow plant were destroyed by fire. The new building is to be 50x208 ft. and when completed will be a great improvement over their former properties which were burned.

Cement

Hanover Cement and Stone Ltd., Toronto, Ont., Canada, is reported in the hands of D. D. McTavish, receiver.

Anna Stone Co., Anna, Ill., of which George Rippetoe is president and general manager, is contemplating the construction of a cement plant to cost about $3,000,000.

Cement Products

Art Stucco Co., Philadelphia, Penn., of which R. L. Cook is president, contemplates establishment of a plant in Jacksonville, Fla.

Kaltz Bros. & Kelly Co., Ferndale, Mich., manufacturer of concrete blocks, etc., has increased its capital from $30,000 to $45,000.

Salinas Concrete Pipe Co., Salinas, Calif., is reported to be buying an entirely new outfit of machinery and equipment for its plant, shipping the equipment now in use to the plant at Soledad. G. Fegulia is manager of the Salinas plant.

Doylestown Concrete Brick and Block Co., Doylestown, Penn., has begun the construction of a new plant along the line of the Philadelphia and Reading Railway, to cost approximately $50,000 with equipment. S. G. Davis, Doylestown, is president, and Robert G. Wood, secretary and treasurer.

Marble Products Co., Kansas City, Mo., organized to manufacture artificial marble, opened its factory recently at 14th street and Chestnut avenue. The product of the company is a building material made of cement chemically treated to give a glossy surface. The process for the manufacture of the product was invented by J. J. Burke, a Kansas City Engineer, it is stated.

Silica Sand

Eureka Flint and Spar Co., Lewis street, Trenton, N. J., is planning to rebuild its local plant No. 2, on New York avenue, destroyed by fire October 11, with loss of $60,000, including pulverizing, grinding, sorting and other machinery. Frank W. Thropp is president.

Lime

Stevens Point Pulp and Paper Co., Stevens Point, Wis., is planning the construction of a $25,000 plant for reburning lime. E. C. Goodell, general manager.

Personals

Edward **Breitwieser** is no longer connected with the Dorr Co., but is now with the Phillips Chemical Co., Glenbrook, Conn.

Ernest Ashton, chief chemical engineer of the Lehigh Portland Cement Co., Allentown, Penn., absent for some time on a business trip to Europe, has returned to his office.

Roland Woodward, Jr., has resigned as development engineer of E. R. Squibb & Sons, New York, to accept a position with E. I. du Pont de Nemours & Co. in Wilmington, Del.

Waldemar Dyrssen, for several years connected with the United States Steel Corp. in the capacity of metallurgical engineer, has been appointed chief engineer of the furnace equipment and hammer welding departments of the Blaw-Knox Co., Pittsburgh, Penn.

Dean E. Winchester, who was formerly with the U. S. Geological Survey and in that capacity made the first complete report on our oil-shale resources, is now engaged in consulting work in Denver. He has recently removed his offices to 440 Steel building and has announced that he will confine his attention to geological surveys in connection with petroleum, oil shale and coal.

Arthur Levison, highway engineer, United States Bureau of Public Roads, has been appointed chief engineer of the road building department of the Blaw-Knox Co., Pittsburgh, Penn. Mr. Levison's experience with the United States Bureau of Public Roads, which is recognized as the foremost engineering organization on highways, will be utilized, the company states, in improving the design of its road-building equipment, cooperating with engineers and contractors to enable better roads to be built more economically, and developing new apparatus for the construction of better and more lasting highways.

Obituary

A. A. Huck, for 13 years superintendent of the Canada Cement Co.'s Mill No. 5 at Belleville, Ont., died at Belleville recently.

Manufacturers

Newark Wire Cloth Co., Newark, N. J., announces that it has established a new branch office in the New England states, at 66 Hamilton street, Cambridge, Mass., with John G. Loring in charge.

Sawyer Specialty Scales Co., Jacksonville, Fla., is successor to W. H. Sawyer & Sons Co., Americus, Ga., whose plant was destroyed by fire October, 1919. The business was removed to Jacksonville, Fla., and was taken over by the present company. Hopper valves and sacking and barrel-filling scales are products of the company.

Northwest Engineering Co., Chicago, Ill., announces that its equipment in the Pittsburgh territory will be handled by the Beckwith Machinery Co., 500 Arch street, Pittsburgh, Penn. The Los Angeles territory will be taken care of by he Collins-Kay Co., Los Angeles; and the Northwest company has established its own branch office in San Francisco at 23 Main street, under the direction of W. W. Mutter.

National Engineering and Equipment Co., Anderson, Ind., has been incorporated by W. N. Durbin, former president, and R. I. Van Winkle, former secretary, of the Anderson Foundry and Machine Co., together with Jos. E. Hennings and Linfield Meyers, Anderson bankers. The company will specialize in power equipment and kindred lines with special attention to plant design and construction, as well as equipment for crushing and pumping plants for the stone, and sand and gravel industries, and also for brick and clay working plants.

Cleveland Worm and Gear Co., Cleveland, Ohio, manufacturer of worm gearing for automotive purposes and Cleveland worm-gear speed reducers for industrial purposes, has moved into its new plant which is located on East 80th street, south of Kinsman avenue. The first unit which has been erected at an approximate cost of $200,000 is of one-story construction, monitor type, with steel sash wall design and will have a total floor area of 45,000 sq. ft. A. H. Clark, president; Howard Dingle, vice-president and general manager; M. L. Thomson, second-vice-president; H. C. Robinson, treasurer; and A. C. Blair, secretary.

Trade Literature

Sawyer Specialty Scales Co., Inc., Jacksonville, Fla. Bulletin illustrating and describing hopper valves and sacking and barrel-filling scales of this company's manufacture. This is a ready reference book, giving specifications, as well as diagrams of the parts numbered and named.

Traylor Engineering and Manufacturing Co., Allentown, Penn., has just issued a new profusely illustrated Bulletin 109, completely describing its Bulldog finishing crusher. It is of special interest to the sand and gravel industry, because in the past it was often the custom to discard the hard "nigger-heads" that accumulated. The company states that the Bulldog finishing crusher is designed to withstand the terrific strains to which a breaker crushing this hard rock is subjected. This crusher has the same features as the larger type of Bulldog crusher. A copy of the bulletin may be had by writing to the company.